

Railway Maintenance Engineer

Volume 14

March, 1918

Number 3

(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age Gazette* and *Railway Engineering and Maintenance of Way*.)

Published on the last Thursday preceding the date of issue by the
SIMMONS-BOARDMAN PUBLISHING CO.,
TRANSPORTATION BUILDING, CHICAGO, ILL.

NEW YORK: WOOLWORTH BLDG. CLEVELAND: CITIZENS' BLDG.
WASHINGTON: HOME LIFE BUILDING.
LONDON: QUEEN ANNE'S CHAMBERS, WESTMINSTER.

EDWARD A. SIMMONS, President. LUCIUS B. SHERMAN, Vice-President.
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H. H. SIMMONS, Business Manager.

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Entered at the Post Office at Chicago, Ill., as mail matter of the second class.

Subscription price, including the twelve regular monthly issues of the *Railway Maintenance Engineer* and the four daily issues of the *Railway Age*, published in connection with the annual convention of the American Railway Engineering Association: United States, Canada and Mexico, \$1.00; foreign countries (excepting daily editions), \$2.00.

WE GUARANTEE, that of this issue 8,200 copies were printed; that of these 8,200 copies, 7,315 were mailed to regular paid subscribers, 135 were mailed to advertisers, 79 were mailed to exchanges and correspondents, and 671 were provided for new subscriptions, samples, copies lost in the mail and office use, that the total copies printed this year to date were 24,800, an average of 8,266 copies a month.

The *Railway Maintenance Engineer* is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.)

CONTENTS

EDITORIALS	85
LETTERS TO THE EDITOR.....	87
NEW BOOKS	88
FIGHTING SNOW IN THE CHICAGO TERMINALS.....	89
DISPOSING OF SNOW AND ICE WITH STEAM.....	92
WOOD PRESERVERS DISCUSS WAR PROBLEMS.....	94
THE WAR'S EFFECT ON LABOR SUPPLY; E. T. HOWSON.....	94
CONDITIONS IN THE TIE MARKET.....	95
CAUSES AND PREVENTION OF FAILURE IN CREOSOTED WOOD BLOCK FLOORS; L. T. ERICKSON.....	96
THE CREOSOTE SITUATION.....	98
OPERATING DETAILS OF THE BONUS SYSTEM; W. C. NISBET.....	99
QUESTIONNAIRE ON IMPROVEMENTS.....	101
TRACK INSPECTIONS CREATE RIVALRY.....	102
ADVANTAGES OF TRACK INSPECTION; J. W. POWERS.....	102
KEEPING ACCURATE RECORDS OF MATERIAL; J. T. BOWSER.....	105
PENNSYLVANIA REJECTS SCREW SPIKES.....	108
NATIONAL RAILWAY APPLIANCES ASSOCIATION EXHIBIT.....	108
DOING MAINTENANCE WORK BY CONTRACT; H. KNIGHT.....	110
IMPROVED HIGHWAY CROSSING CONSTRUCTION.....	111
THE MATERIAL MARKET.....	112
GENERAL NEWS	113

The discussion at the recent convention of the American Wood Preservers Association brought out prominently the problems now confronting this industry and also the railways because the latter consume over three-quarters of all timber treated.

The Present

Use of

Treated Timber

The most critical situation arises from the shortage of preservatives, the supply of which has been curtailed by the stopping of importations from Germany and Belgium and more recently by the lack of boats to bring imports from England and by the commandeering of large quantities of oil by the English government for fuel purposes. The supply of dimension timber available for railway use has been seriously reduced during the last few months by the necessity of providing first for the extensive construction program of the government. Conditions in the tie market have been aggravated by the shortage of labor so that the output of ties has been greatly reduced. The result of these unfavorable influences is shown in a considerable decrease in the amount of timber being treated. While this has occurred at a time when the roads have somewhat reduced the amount of timber used, it has led to the greater use of untreated timber and this frequently of an inferior grade. In this way the immediate needs of the roads have been satisfied, but the penalty will be paid when this untreated timber requires premature renewal a few years hence. Confronted as the roads now are with an inadequate supply of treated timber, the track and bridge and building departments are facing the problem of diverting the available treated timber to

those projects for which it is most urgently required and in which it will show the greatest economy. This will lead, for instance, to the use of treated timber in those places where the renewal is most expensive and most difficult because of operating or other conditions.

The winter of 1917-18 will long be remembered by track men because of the severity of its storms and the intensity and duration of the cold weather. The repeated snow and sleet storms have required almost superhuman efforts to prevent the absolute blocking of many lines

When the

Frost

Goes Out

while the long continued periods of low temperature have driven the frost far deeper into the sub-grade than usual and in spite of all that the track men have been able to do, much of the track, even on the heavy ballasted main lines, has been rougher than is usual for this time of the year. As the winter draws to a close and as the snow and ice begin to disappear it is only natural that those who have been fighting the elements throughout the long winter will be inclined to relax somewhat and to feel that the worst is over. However, because of the condition which the tracks are now in utmost vigilance will be required to insure safety of operation during the early spring. The depth to which the frost has penetrated this winter, indicates that the heaving incident to its departure will be more pronounced than usual and track men can afford to leave no precautions unobserved to prevent accidents during this period which will soon arrive. Preparations for this condition should now be made.

CONCRETE WORK IN 1918

COMPARATIVE STUDIES for railway structures for the 1918 budget should give full consideration to the possibilities of concrete. The relative costs of steel, concrete and timber structures are primarily questions of careful estimating, but in these times the problem is not always to determine which material will be the cheapest, but which one can be delivered in time to be of any use. The fixing of steel prices has brought the cost of steel to a more nearly comparable relation to other materials, but with the great demands imposed on this industry and the effect of priority rules, steel ordered at the present time cannot be delivered for many months. While the prices on timber have not advanced as much as those for steel, great demands are being made for lumber for ship building and temporary construction of all kinds required for war activities. The lumber industry is also suffering not little difficulty in making deliveries, and in general lumber purchases involve shipments over long distances.

The situation with regard to concrete is different. Owing to the marked decrease in building operations and a considerable falling off in road construction, there has been a decrease in the demand for concrete materials. The only question lies in the use of the cars necessary to deliver the supplies. In most localities sand, gravel, stone or slag can be obtained within a reasonable distance of the work, while the cement in all cases involves the least bulk of the material. Reinforcing bars may cause some trouble, but as the reinforcement represents the smallest item in most work, even though the cost is high, it is usually worth while to pay the premium necessary to obtain it rather than to do without it by using plain concrete. From the standpoint of the supply of materials, concrete construction presents an encouraging aspect which deserves careful consideration.

THE RAIL SITUATION DEMANDS ATTENTION

ON MAND ROADS the allotment of new rail on main lines has been determined in past years more by the needs for relaying rail on branch lines than by the actual condition of the main line rail itself. In the same way during the last decade the rail requirements of the branch lines have been determined more by the desire of the managements to strengthen these lines to permit the operation of heavier equipment than by the fact that this rail was actually worn out. In other words, the degree of wear has not itself been the determining factor in many instances.

Now all of these conditions have suddenly been changed. Following the outbreak of the European war the steel mills of this country were overwhelmed with orders and the resulting congestion made it increasingly difficult for the roads to secure rails. This condition has continued for the past three years and has resulted in a marked decrease in rail renewals. With the entry of the United States into the war last April, matters have become worse, for the mills have been diverted to the manufacture of war products, very largely to the exclusion of rails, and the tonnage of this product in 1917 was far below that of any recent year. As a result there is now an accrued depreciation of the rails in track in this country, equivalent to at least two full normal season's renewals. In Canada the situation is even more critical for the roads there have secured almost no rails during the last three years and they are now taking up tracks in some instances to secure the materials needed for individual replacements.

These conditions cannot continue indefinitely. Rail wear is measured almost directly by the tonnage passing

over it and there is a definite limit of wear beyond which operation cannot be continued without the impairment of safety. This situation was brought to the attention of the Canadian Government last year, with the result that orders were issued for the mills in that country to roll a certain tonnage of rails which, while inadequate for normal needs, offered some measure of relief.

In making up the programs of rail renewals this year a responsibility rests upon the engineers in charge. While considering rail requirements from the standpoint of the quantity actually needed to insure safe railway operation, it is necessary to bear in mind that this tonnage must be kept at the minimum to avoid any unnecessary decrease in the output of war materials. The government has not yet indicated the extent to which the roads will be able to secure the rails desired, but since it is now responsible for the operation of the roads, it is to be expected that it will protect its interests in them as well as those of a military nature. The preparation of the rail renewal program this year has become one of national importance and is one which deserves the most intelligent and careful attention and the best judgment of those responsible for the safe maintenance of tracks from roadmaster and foreman to chief engineer.

ATTEND THE CONVENTIONS AND EXHIBIT

THE ANNUAL CONVENTION of the American Railway Engineering Association, the stated meeting of the Railway Signal Association and the exhibit of the National Railway Appliances Association will make Chicago the mecca for railway men interested in the problems of the engineering and maintenance of way departments of the railways of the United States and Canada during the third week in March. These meetings have drawn an increased attendance from year to year. In addition to all of the reasons which have led men to come to Chicago on this occasion in previous years others prevail this year to justify a larger attendance. Railway men of all ranks are busier this year than ever before; they are being called on to do more work in the face of shortages of labor and of materials and are expected in spite of these handicaps to maintain the roads in condition to handle the Nation's business. These men, therefore, need more assistance than ever before—more knowledge of improved conditions and materials and of recent developments in labor saving devices. Nowhere can an engineering or maintenance officer gain more information of this character than at these meetings. The wide awake man who realizes the intensity of the problems which will confront him this year will avail himself of this opportunity for more thorough preparation.

Valuable as these meetings are for the chief engineer and his immediate assistants, the benefits are by no means restricted to them. The meeting of the Engineering Association will be of unusual interest and value to men lower down in the ranks this year because of the increased attention which will be paid to the discussion of labor problems. The exhibit is also of value to supervisors and to foremen as well as higher officers and the manufacturers are making a special effort this year to present their devices in ways which will make their exhibits of the maximum educational value to men of all ranks. A number of the roads send all or a large part of their supervisors to visit the exhibit. The Canadian Pacific selected one road master from each of the thirteen divisions on its Eastern lines last year who came to Chicago in charge of the assistant engineer maintenance of way. The Chicago & North Western held its annual meeting of road masters of the system at Chicago dur-

ing this week last year and arranged for these men to spend a day at the Coliseum. A number of the roads in the vicinity of Chicago have arranged for all of their foremen to visit the exhibit, while others at a distance send one or two from a division and these men present reports to their officers and to the other foremen. These practices are of much educational value and the roads can well afford to give them special consideration this year when it is necessary to secure the maximum results from every man in the department.

WHAT HAVE YOU DONE TO RELIEVE THE CAR SITUATION?

THE SHORTAGE of cars is more serious now than ever before. The railways are confronted with the greatest crisis in their history in their attempt to provide a sufficient number of cars to move the traffic offered to them. Shippers are responding to the appeals of the roads to load cars to capacity and to load and unload them promptly, but, important as this is, it has not been sufficient to overcome the situation. The maintenance of way department is one of the largest shippers on the railways, requiring the movement of large quantities of materials for routine repair and betterment operations. From the interest which the men in this department have in the success of the roads which employ them they should take a leading part in campaigns to conserve cars. It is, therefore, somewhat surprising to find operating officers complaining frequently that the improvement in the handling of equipment has been less marked on the part of company employees than shippers. Such should not be the case.

Maintenance of way officers will frequently attempt to justify delays to cars by pointing out the fact that the per diem on a car is less than the additional expense required to move a gang and unload it. In normal times if these delays to cars are at all serious they are usually an indication of poor management on the part of the local maintenance officers. Under present conditions they should not be tolerated. However, maintenance officers have, in general, risen to the necessity of the occasion and have given this subject close attention during the past year. As a result they have adopted many measures which tend to conserve equipment, both through loading cars heavier and through releasing them promptly. Another measure of the same character which has been adopted in a number of instances has been the curtailment of work train service by arranging for one train to do the work of two or more branches of the service. This and similar measures tending to restrict the use of equipment to the bare necessities are of particular importance at the present time.

In order to indicate what has already been done in this direction and to point out further steps which may be taken we announce a contest on The Conservation of Equipment by the Maintenance of Way Department, for which we solicit discussions of a practical nature, pointing out ways in which the interests of the railways may be protected in this respect, and citing as far as possible definite illustrations. To stimulate interest, we offer prizes of \$25 and \$15 for the best and second best papers respectively and will pay our regular space rates for all others accepted and published. The prizes will be awarded to those papers which present the most valuable suggestions for the conservation of cars. Contributions to this contest should be sent to the editor of the *Railway Maintenance Engineer*, 608 South Dearborn Street, Chicago, and must be received on or before April 10, to be considered by the judges.

LETTERS TO THE EDITOR

THE EFFECT OF SUNLIGHT AND SHADOW ON RAIL MOVEMENT

Chicago, Ill.

TO THE EDITOR:

Careful observation over a large field covering a very considerable period of time leads to the conviction that the primary causes involved in what is commonly called "rail creeping" have, in a way, been overlooked; and that too much attention has been given to curing direct the mechanical effects, the assumption being, and that correctly, that the rail creeps with the traffic faster down hill than up, etc. Present practice working upon this correct assumption has made very consistent efforts to hold the rails from moving in one direction so as to lessen the mechanical effect of this movement. However, many odd movements of the rails take place on every railroad during each 24 hours. These odd movements are so pronounced that we must consider another and more powerful cause (force) working at times with the traffic, increasing its effect two or more fold, then working against the traffic not only retarding the forward movement of the rails, but in many cases producing rail motion against this traffic.

The effects of expansion or contraction (sunlight or shadow—night or day) are so mighty, so absolutely certain to occur, that we cannot afford to overlook them and consider that all has been done by arresting mechanical effects of traffic, when natural causes are still producing results that are doubling these mechanical effects many times in some part of each 24 hours. This mighty force should not be overlooked when a little thought, a little effort, will make it an aid—not an opposing force. It can so be used. Why not take advantage of it?

The differences of temperature between night or day in some latitudes have marked effects upon rail creeping, but as the lowering or raising of temperature embraces large areas at the same time, the creeping is not so pronounced as when the differences in temperature are localized. However, it is well to bear in mind that this contraction or expansion is bound to be in the direction of least resistance. Where rails have been anchored one way only the rail is bound to contract in a direction opposite to the way it is anchored, except in cases where the pull is stronger than the holding power of the anti-creepers and greater than the tie resistance when the rail must move either through the anti-creeper or the ties will be moved. The difference of temperature between sunlight and shadow in all latitudes have, because of their very local extent and variableness of time, not only a marked effect on the rail creeping, but unquestionably are the causes that produce the odd movements of the rails, some of which are:

1. One rail on a straight track traveling with the traffic much faster than the other rail.
2. One rail moving with the traffic, while the other rail is moving against it, or both rails moving against the traffic.
3. One rail moving with the traffic and the other rail without any appreciable movement.

Again these odd movements are not continuous during the 24 hours; one rail will move one way in the morning and in the opposite direction in the afternoon; or both

rails will move against the traffic for a period and then reverse their motion and move with the traffic. Particularly noticeable is the odd movement where rail creeping is pronounced, viz., that under the same traffic conditions the movement of the rail is vastly accelerated during certain periods of the day. All these conditions exist today to a greater or lesser extent on every railroad in the country.

Sunlight and shadow (meaning heat in one case and comparative cold in the other) are, on account of consequent expansion or contraction, forces to be reckoned with. We cannot stop metal from expanding or contracting—we can only provide for it. We acknowledge this when we take care to lay rails with a certain space left between their ends. When the rail is laid, however, as far as expansion or contraction is concerned, it is forgotten. Nothing is done to keep the proper space between the rails; in fact, everything is done to convert the rails into practically continuous rails for miles by letting them jam end on end; or what is the same effect, bolting the angle bars so tightly that the rails cannot move between them.

That is, to make it absolutely certain that the space between the rail ends left for expansion shall be entirely nullified as to its usefulness, the modern track bolts are made to be screwed so tightly as to absolutely stop the rails from moving between the angle bars; and, as is usual, when a natural force (expansion or contraction) is overlooked the results are just opposite to expectations. In this case, the bolts are screwed tight to keep them from getting loose, whereas the very fact that the bolts are so tight results in loose bolts. (Take any stretch of track on any railroad, tighten the bolts so as to keep the rails from sliding between the bars and you will find about every eighth joint with loose bolts; that is, eight rail lengths expanding as one rail length, is bound to find a joint that is weaker, kick it out of line and bend the rail end. Sequel—loose bolts, and this is the joint or its brother that you hear about. Because it is the one that keeps getting loose; you never hear of the tight bolts.)

We cannot stop the pull that must occur on a length of rail when the rails pass from sunlight into shadow. We can, however, provide for it. We cannot stop the push that must occur on a length of rail when the rails pass from shadow into sunlight. We can, however, provide for it.

To provide for it, we must anchor each rail in the place we lay it. We must keep the proper space between the rail ends. We must anchor the rails in both directions. We must allow the rails in expanding and contracting to move between the angle bars.

If we anchor the rail in one direction only, we provide for the mechanical force of traffic in a make-shift manner, not recognizing at all the tremendous forces of expansion and contraction. If the pull or push of the rail is with the one-way device, the rail must move either through the device or move the tie; or, if against the action of the device, then the device is moved away from the tie—never equally—as the ties are movable themselves. Consequently, when traffic starts the readjustment of the one-way device to the tie, it must take place unequally; hence some ties are moved and some are not.

No matter how many of the devices or how tight their grip, the rail, where this readjustment is taking place, must have motion forward (slight in many cases), but at the end of each 24 hours still forward with the traffic. When we anchor each rail from moving with the traffic and from moving in a direction opposite to the

traffic, we not only take care of the mechanical forces of traffic, but also provide for the natural forces of expansion and contraction by keeping the proper expansion (space) between the rail ends. WARREN M. OSBORN.

NEW BOOKS

Business Law for Engineers. By C. Frank Allen, formerly professor of railroad engineering, Massachusetts Institute of Technology. 6 in. by 9 in., 457 pages. Bound in cloth. Published by McGraw-Hill Book Company, Inc., 239 West Thirty-ninth St., New York. Price \$3.

In this book there is combined under one cover a manual of commercial law for the use of the layman and a treatise on engineering and construction contracts. The first is similar in many ways to the familiar texts designed for the use of the business man, except that in this case the special treatment is for the benefit of the engineer, and more especially the railway engineer. The arrangement, however, follows the usual form with chapters on torts, equity, corporations, agency, negotiable instruments, etc. In each chapter, however, the engineer is kept in mind and the examples cited to illustrate the law are such as would be encountered in engineering experience. Two chapters are worthy of special mention, since they are of special significance. They are, "Railroads" and "Engineer's Relation with Others."

The second part of the book deals in turn with the advertisement, information for bidders, proposal, contract form, bond and specifications, each subject being illustrated by a number of forms taken from actual practice or of general acceptance. Prominent among these is the uniform general contract of the American Railway Engineering Association and the standard form of the American Institute of Architects.

Railroad Structures and Estimates. By J. W. Orrock, principal assistant engineer, Canadian Pacific, Montreal, Que. 580 pages. 272 illustrations. 8½ in. by 5½ in. Bound in leather. Published by John Wiley & Sons, Inc., New York. Price \$5.

While a man who is called upon to make estimates for engineering and maintenance of way work usually has data at hand showing the cost of the work more commonly encountered, a wide diversity of problems arise from time to time for which information is desired and not readily available. In this book the author gives a large amount of cost data which will be found valuable for estimating the amounts of materials, as well as their costs, for a wide diversity of problems encountered on steam railway work. Liberal use has been made of data published in the technical magazines in addition to those contained in the files of many railways. The contents are arranged in a manner to make them available for ready reference.

The book should be found particularly valuable to maintenance of way men confronted with the problem of preparing estimates for work with which they are not thoroughly familiar, as well as for checking estimates, for which they have data. It will be found of particular assistance in determining the amount of track and other materials required for work. Because of the wide variation in prices at the present time, those used in this book are those which existed in normal times previous to 1915.

The book is divided into 20 chapters, typical headings of which are Track Materials and Estimates; Structural Materials and Estimates; Bridges, Trestles and Culverts; Rail; Other Track Materials; Track Laying and Surfacing, Shops and Engine Houses, Snow Fences and Snow Sheds, and Station and Other Buildings.



Conditions on the Lake Front

FIGHTING SNOW IN THE CHICAGO TERMINALS

January Blizzards Compel Railroads to Employ Large Forces of Men to Restore Tracks to Operation

ACCORDING TO the statistics of the United States Weather Bureau, more real winter weather was concentrated in the one month of January, 1918, in the vicinity of Chicago than is generally offered to the people of that locality in an entire winter. The snow fall, for instance, was 44 in., or 4 in. more than the usual fall for an entire winter. The month was also remarkable for the uninterrupted cold weather, with only one day above freezing, and for the severity of two snowstorms less than a week apart, the first bringing a fall of 15 in. and the second a deposit of 8 in., before sufficient time had elapsed to recover from the effects of the first blizzard. The conditions were made especially grave because the Chicago terminals were seriously congested with a heavy traffic, so that the storms came as a climax to what was already a bad situation. As a result freight traffic was paralyzed and it was only by a strenuous effort that the milk trains and coal cars were moved in sufficient number to avoid a milk famine and prevent a shutdown of utilities absolutely essential to public welfare. The efforts made by the railway men in Chicago to overcome the blockade were exerted in the face of serious obstacles, and the rapidity with which the lines were opened to traffic testifies as to their zeal and efficiency.

The character of the conditions produced by the storm is illustrated in the photographs. A large part of Chicago's railway mileage is on elevated embankments and in places where these embankments are occupied by only a relatively small number of tracks, the wind accompanying the storms swept away most of the snow, but in many cases main tracks on the elevation are flanked on one or both sides by yards of considerable width, so that the conditions approximated that to be expected where tracks are on the natural surface. In general the chief difficulty was with the many miles of yard tracks occupied largely by standing cars, the movement of which at the earliest possible date was imperative to the welfare of the city and also the nation.

Conditions on the Illinois Central differed to a considerable extent from those of the other railroads, owing to the fact that several miles of its line is exposed to an open sweep of the wind off Lake Michigan. The eight

main tracks of this railroad are bounded on the side away from the lake for a considerable distance by a high retaining wall and the snow, piling up against this wall, completely buried the two adjacent tracks and the equipment occupying them. At a few points in this distance, structures located on the east or lake side of the tracks also formed sufficient of a snow stop to pile up drifts over the two east tracks, and, as a consequence, all of the tracks of the line were blocked except the third and fourth tracks from the east side, which are used normally in freight service. North of Twelfth street, where the tracks occupy a depressed location with retaining walls on both sides, the difficulties were intensified as shown in one of the photographs.

LARGE FORCES EMPLOYED

The railroads all employed large forces of men in the removal of the snow, and considering that their demands were combined with those of the city and industries for men, it is not surprising that the wage rates in some cases reached as much as \$1 per hour. There was, however, a considerable supply of labor and in general the railroads did not pay much more than 50 cents. The wholesale shutting down of industrial plants as the result of the blockade threw many men out of employment who were glad to work at shoveling snow. Some industrial plants turned over large forces of men to the railroads temporarily, while the latter were enabled to recruit large forces from freight handlers, office clerks, draftsmen, etc., many of whom could not be employed at regular work on account of the stoppage of the traffic. It is also found that lodging houses were accommodating an unusually large number of idle men who had come into the city for the winter.

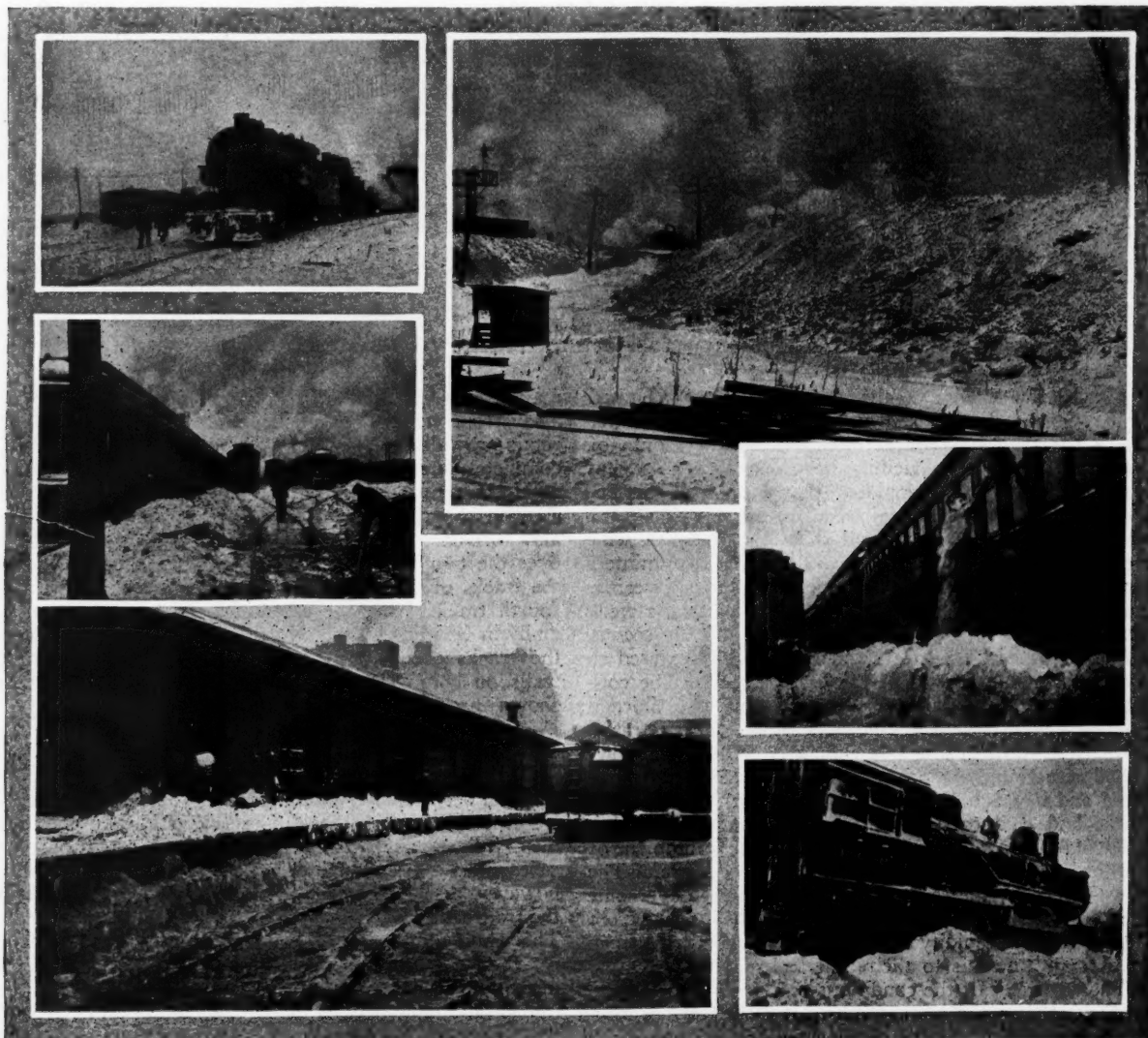
Various plans were adopted for recruiting the forces. Some railways depended on the regular employment agencies. Others resorted to the free labor agencies or to picking up the men direct from the street or the lodging houses. Employment was also encouraged by making special arrangements to pay the men promptly, a measure which introduced no small task in the time-keeping and accounting. It was also necessary to feed the men one or more meals each day.

The Illinois Central recruited its men largely from the lodging houses and had a plentiful supply of men at nearly all times. One practice that had a pronounced influence on this situation was the paying of the temporary men each morning for the work done on the day before. Special attention was also given to the feeding of the men at least one meal each day. A mess train was stationed at the Park Avenue station to feed all men employed in that vicinity. The foremen were also

railroad's station at Canal and Sixteenth streets, where headquarters was established for directing the fight on the snow. In this way a large force was made available without loss of time.

SUPERVISION ESSENTIAL

The administration of the work on large terminals, such as are operated by a great many different roads in Chicago, in a manner that would insure most effective



DOUBLE HEADING TRAINS
CLEANING OUT SWITCHES
CONDITIONS AT A FREIGHT HOUSE

A SNOW DUMP
CLEANING COACHES UNDER DIFFICULTIES
A DEAD ENGINE

furnished with order blanks for meals at lunch-rooms and boarding houses. These forms were made out in duplicate, one being turned over to the man furnishing the meal and the other sent into headquarters by the foreman.

On the Monday and Tuesday following the storm of January 12th, the Chicago, Burlington & Quincy used 400 of its office employees for snow work, a great many of whom lived in suburbs on its own line. By the use of the telephone on the Sunday preceding, a large number of these employees were directed to report at the

results and a thorough co-ordination of efforts being made by the various branches of the quickly created organizations was no simple task. In this connection the Baltimore & Ohio Chicago Terminal developed an interesting system. Several men known to have had previous experience in fighting snow were placed in charge of certain sub-divisions of the line and made responsible for the progress within certain prescribed limits. In order that the officers of the road could be kept advised of the conditions at all parts of the terminals and of the progress being made in restoring the

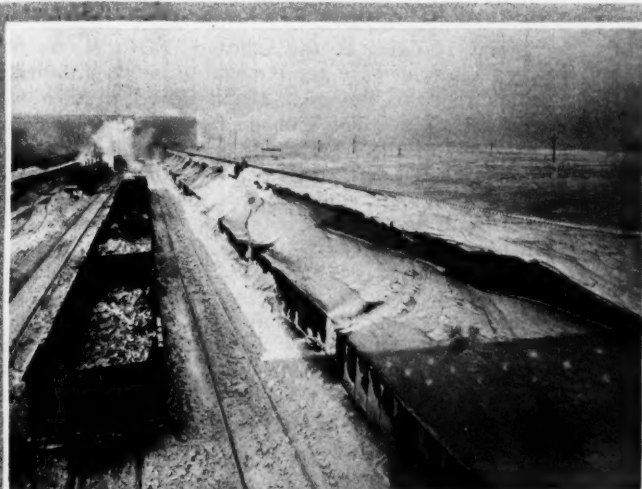
tracks to operation, as well as to give the necessary advice and to despatch men, materials and supplies where most needed, an intelligence bureau was established in the office of the district engineer. All the telephones in the engineering office were assembled on a single large table, where a staff of men was kept busy receiving and answering telephone calls, while a record of the information given and received was kept on a rapidly devised chart.

This chart was blocked off to show the previously-designated headquarters for conducting the work, each block giving the name of the man in charge and the

ous requirements recorded on the chart. A certain number of men were commissioned to gather laborers, others to requisition or purchase tools, provide lunches for the men, look after equipment, etc.

WORK DONE LARGELY BY HAND

By far the largest portion of the snow was handled by shovels. In a complex terminal switches, signals, suburban stations, cars tied up on tracks and other obstructions tend to discourage the use of power equipment in many places; consequently the snow was largely loaded by hand onto cars of all classes, flat cars, gon-



CARS BURIED IN A DRIFT
ONLY ONE TRACK OPEN

LARGE DRIFTS WERE FORMED
WHY ONE TRAIN WAS LATE

names of his foremen, as well as the number of men employed at a particular time. As the men in charge asked for additional men, or tools, lunches, etc., the facts and the time of day were noted on the chart, and as soon as these various wants were satisfied, a note was made on the chart of the arrangement as carried out. Thus it was possible at any time to obtain a complete idea of the entire situation from an examination of the sheets, and any arrangements overlooked or any orders unfilled were evident at a glance.

The successful conduct of this plan implied a well-organized staff at headquarters to take care of the vari-

dolas, hoppers, box cars and cattle cars and hauled to a convenient point of disposal where the cars were again unloaded by hand. In some cases coal cars were forwarded direct to mines in the southern or central part of the state where the snow was unloaded on mine spoil banks.

The Baltimore & Ohio Chicago Terminal used four locomotive cranes with clam-shell buckets for unloading snow from cars and, while a large yardage was handled in this manner, it represented only a relatively small proportion of the total amount of snow unloaded. The Burlington also used a crane and clam-shell bucket, as-

signed to coaling and cinder pit service, in excavating snow during intervals of the day when it could be spared from its regular work.

On the Illinois Central much of the snow could be dumped directly into the lake and 100 wooden boxes capable of carrying 7 or 8 cu. ft. of snow, with handles on the sides so that they could be carried by two men, were provided for use in this service to carry snow across the tracks to the lake in close quarters where the snow could not be handled conveniently in larger quantities. This road also used a work train of flat cars, which was spotted when loaded on a track next to the lake, where the snow was shoveled off by a crew of 100 men. In some cases wagons and motor trucks were used to haul snow from team yards and freight house grounds, dumping the snow into the Chicago river or a slip.

SPREADERS WERE EFFECTIVE

Snow plows were used where practicable, but their use was limited largely to main tracks. On the whole, the supply of plows for such use as they could be put was generally adequate. One road, however, found it expedient to import a rotary snow plow from western heavy snow country for clearing drifts in cuts, but this use was restricted principally to tracks at some distance from the city. Of all the equipment available the greatest results were secured with the ballast spreader. This was used in some cases with short wings to clear and flange a single track, but the most efficient results were obtained with long wings used to clear the adjacent

track while the one occupied by the spreader was being flanged. By following this procedure progressively on one track after another, it was possible to clear an entire yard of snow, although in some cases it was found advisable to block one track with snow plowed from a series of tracks on either side and later clear this track by shoveling the snow onto cars.

Whether the tracks are cleaned by hand or with spreaders, the most difficult task was to remove cars that had occupied these tracks during the storm with the snow in many cases well up under the car bodies. These cars had to be pulled out in small cuts, using one or more engines for three or four cars, a process that frequently proved disastrous to the draft rigging.

Special facilities at the Chicago & North Western passenger terminal for the removal of snow, installed at the time that this station was built served in good stead during the storm. This embodied snow melters installed at the ends of the train sheds and throughout the approach tracks. There are 10 of these, consisting of boxes about 3 ft. by 6 ft. equipped with steam pipes and connected by drains with the city sewers. Shoveling snow into these boxes solved the problem of disposal here.

As the work on the various railroads progressed and the tracks were restored to operation it was possible gradually to reduce the maintenance forces on the various railroads to more nearly the normal basis. The thaw setting in early in February gradually removed the remaining snow, but this came so late that it was not a factor in clearing the tracks for service.

Disposing of Snow and Ice With Steam

TO FACILITATE the movement of approximately 200 trains daily in each direction at its Jersey City terminal during the winter months, a maximum of 38 trains into and out of the terminal in one hour and at certain times in the rush hours, in addition to the large number of movements necessary in making up trains and in handling locomotives to and from the engine terminal, the Central Railroad of New Jersey has employed steam for melting snow and ice at switches and derails, for the past three years. The thawing apparatus is utilized in connection with the interlocking system which is of the electro-pneumatic type. In addition to its effectiveness in insuring the uninterrupted operation of the interlocking plants its use results in an important saving of manual labor, a consideration of particular importance in the present acute labor shortage.

The terminal interlocking is divided into three sections designated as A, B and C, each under the control of a separate tower. The track layout in the main plant, A, consists of a nine-track throat across which two ladders extend in each direction. At the west end two of the ladders are extended to the north to include four yard receiving tracks, while at the east end the layout is expanded to include the 20-train shed tracks. The four main ladders are supplemented by five additional ladders, two on the north side and two on the south. The layout provides for connections between the seven northerly train shed tracks and the north coach yard and the ten southerly train shed tracks and the south yard, outside of the limits of the main throat. By this arrangement it is possible to make six moves between the train shed tracks and the coach yards simultaneously and at the same time four moves between the main line and the central train shed tracks.

The track layout includes four main line tracks and three Newark branch tracks to Communipaw as well as a freight and a passenger engine terminal. Tower B controls the operation at the engine terminal yards, where approximately 300 freight and passenger engines are handled daily, and Tower C controls the operation at the junction of the main line with the Newark branch.

The large number of moves made daily makes it imperative to the successful operation of the terminal that the switches be kept clear of snow and ice. To accomplish this by manual labor means the employment of large gangs continuously in the winter months at each unit of the interlocking.

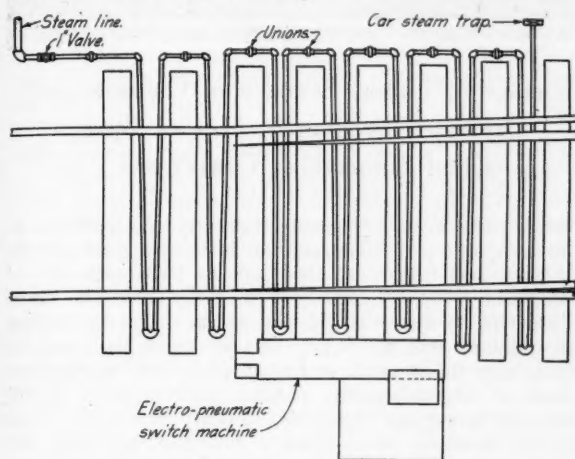
THE THAWING APPARATUS

The snow melting apparatus is provided only in connection with the interlocking. Plant A includes 39 double slip and 3 single slip switches, 40 turnouts and 12 derails. At plant B there are 7 double slips, 7 turnouts and 11 derails, while 13 double slips, on movable point frog, 14 turnouts and 8 derails are controlled by plant C.

The first installation of the steam apparatus was made in the nature of a test in the winter of 1915 when steam coils were provided at eight double slips in plant A. The satisfactory results obtained here led to the decision to provide the apparatus at all interlocked switches and derails. Accordingly in 1916 all of the slips, turnouts and derails in plants A and C were outfitted, and in 1917 work was begun in outfitting plant B. This work is not yet complete and hydro-carbon is burned in this unit to supplement manual labor.

The heat is applied at the switches by means of steam coils, consisting of two lines of 1-in. extra heavy galvan-

ized iron pipe, approximately the same length as the ties. The coils are laid level on the top of the ballast after it has been removed to a depth of 5 in. below the base of rail, and, as may be seen in the plan, the coils are supplied in seven tie cribs, the first coil being placed in the second crib ahead of the switch points. A 1-in. valve is provided at the connection with the steam line and a Gold car trap is placed at the end of the coil to provide drainage, which is collected by 6-in. lateral drains under the tracks leading to sewers along each side of the yard and which empty into a 24-in. outfall sewer. The



TYPICAL STEAM LAYOUT FOR A SWITCH

lateral drains are of cast iron under the tracks and vitrified clay between, laid with open joints. Catch basins are located at frequent intervals to receive most of the surface run-off. Stone ballast is provided throughout the layout and the use of two to three feet of cinders underneath the stone ballast insures adequate sub-surface drainage.

The steam is supplied to the coils through branch lines which radiate from the main steam line of the terminal. This main line is an extra heavy 6-in. galvanized pipe covered with asbestos incased in a cast iron pipe with lead caulked joints. The steam is supplied both from the service building at the east end of the layout and from the Communipaw power plant, the main being con-

tinuous between the sources of supply. An additional 500-hp. boiler was provided at the service building to care for the additional load occasioned by the installation of the thawing apparatus at tower A and it is expected that a similar boiler will be installed at the Communipaw power house when the installation at tower B is placed in service. The branch lines supplying the steam to the coils vary in diameter from 2 in. to 4 in. in accordance with the demands. The coils are all 1-in.

The plant is operated continuously from the first freezing weather until spring. As a result of its operation manual labor is entirely dispensed with for clearing the switches of ice and snow except at times of unusually severe storms, when it becomes necessary to employ small gangs chiefly for patrol duty to make sure that the thawing apparatus is doing all that is expected of it. In such cases men from the gangs regularly employed to clear snow and ice from the hand switches in the passenger yards are generally assigned to this patrol duty.

One of the chief advantages of the apparatus is that it effectively prevents any accumulation of snow and ice at the switches and eliminates the necessity for maintaining gangs to clear away the accumulations caused by storms or the drippings from passing engines and cars as is necessary at plants not so equipped.

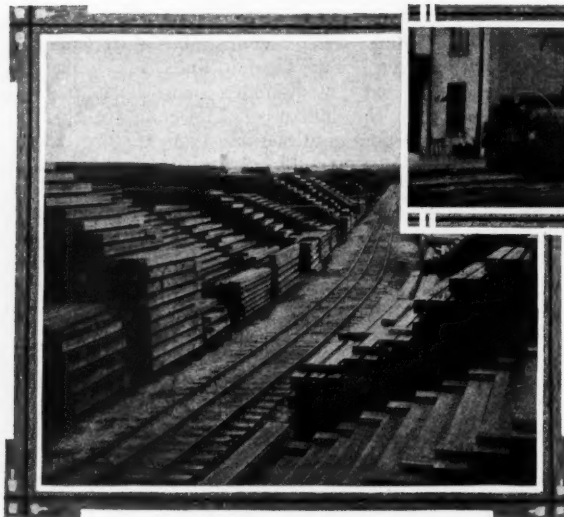
While the number of men it would be necessary to employ to insure the operation of the terminal if manual labor were depended upon to clear away the snow and ice, would vary with the intensity of storms, based on the number of men employed at similar terminals, it is conservative to place the number required at the layout in Tower A alone at from 125 to 175 men. These men would be employed continuously during the storm and after until the accumulations were cleared away. Also, because of the nature of the layout and the frequency of train movements the employment of men for this purpose is extremely hazardous and the safety feature of the plan is one of its important advantages.

The unprecedented cold weather throughout the East during the present winter, together with heavy and frequent snow falls, which at times almost completely paralyzed the operation of railway terminals, has put the efficiency of the apparatus to an unusually severe test. In spite of these severe conditions the plant proved equal to the occasion and this terminal has been operated with very little difficulty within the limits of the territory where the snow melting apparatus has been provided.



RAILWAY TROOPS ASSEMBLING LIGHT RAILWAY TRACK UNITS

WOOD PRESERVERS DISCUSS WAR PROBLEMS



Shortage of Labor, Scarcity of Creosote and Decreased Production of Ties Were Chief Subjects at Convention

THE FOURTEENTH Annual Meeting of the American Wood Preservers' Association was held at the Hotel Sherman, Chicago, on January 22 to 24, inclusive. This was concerned chiefly with the shortage of materials, labor and supplies, resulting from the War. Methods of overcoming the dearth of men through improvements in the working and living conditions of the laborer and through the use of labor-saving machinery, constituted the most actively discussed subject at the convention. However, the reduction in the output of railway crossties and the effect of the resulting decrease in tie renewals on track conditions of American railways were also accorded intensive study. The English embargo on creosote oil and the diversion of the basic material for domestic creosote production into other channels, factors which have resulted in a marked shortage of this important timber preservative, were considered with special interest. The effect of the War on the supply of timber of various sizes, service results with creosoted wood blocks in pavements and floors, fire prevention in creosoting plants were other subjects presented and discussed in addition to the regular annual reports of standing committees.

The officers of this Association for the past year were: President, John Foley, forester, Pennsylvania Railroad, Philadelphia, Pa.; first vice-president, M. K. Trumbull, vice-president, National Lumber & Creosoting Company, Kansas City, Mo.; second vice-president, J. B. Card, president, Central Creosoting Co., Chicago, and secretary-treasurer, F. J. Angier, superintendent of timber preservation, Baltimore & Ohio, Baltimore, Md. The convention was called to order at 10 o'clock on Tuesday morning by President Foley, with an attendance of about 75 members. Following a prayer by J. H. Waterman, a past-president, the report of the secretary-treasurer was presented, which showed a balance of \$149.77 in the treasury and a membership of 291, including 73 members from 36 railroads. Fifteen members were reported in the military or naval service of the United States Government.

In his opening address President Foley referred to the unusual problems of the past year arising from the shortage of creosote, fuel and lumber, and the scarcity of labor, conditions that required extensive readjust-

ment in the wood preserving industry. He referred to the recognition of this condition in the program for the meeting and urged the members to participate in the discussion of these problems in order that the wood preserving industry might do its full part in helping our country win the War. He described the great inroads now being made in European forests, particularly those of the belligerent nations, and referred to the large contributions which this country has made to the lumber demands of its allies. Owing to the heavy cuttings in the forests of Europe, a policy of rigid conservation will unquestionably be instituted after the conclusion of the War. Neutral European nations are already adopting stringent measures of this character. Therefore, the United States, Canada and Russia will be called upon to supply most of the timber needs of the world. President Foley also referred to the fact that 5,000 American foresters and lumbermen are now in France.

THE WAR'S EFFECT ON LABOR SUPPLY

By E. T. HOWSON,

Editor, the *Railway Maintenance Engineer*, Chicago.

Although the labor problem is universal at the present time, no definite statistics are available to show the extent of the shortage of men. Such data as are to be had, however, indicate that the shortage is serious. The payroll of the maintenance of way department of the Southern Pacific, for instance, showed but 6,500 employees in the month of September, 1917, or 4,000 less than in the same month of the year before. The causes of the condition arise both from an increase in the demand for labor and decrease in the available supply. The army draft has increased the number of men who had already been withdrawn from industries through voluntary enlistments and the rapid growth of War industries also made a heavy drain on the labor supply. At the same time, the flow of alien labor into the country through immigration has almost ceased.

Considerable attention has been directed to the Mexican labor supply, particularly in the southwestern part of the country. In the aggregate, however, this source of supply is unimportant, and since the passage of the alien labor law on May 1, 1917, almost a negligible number have migrated to this country. To illustrate, in April, 1917, a month before the passage of the law in question, 1,500 Mexicans crossed our borders, whereas in May, 1917, only 96 Mexicans entered. The only other source of labor is Asiatic, and whereas thousands

of Oriental workers have passed through Canada on their way to France to perform the unskilled labor of that country, the United States Department of Labor has consistently opposed the influx of that class of labor into this country. The Department of Labor has, however, arranged to import 110,000 Porto Ricans.

This government bureau has recently been given wide powers, among which is the authority to give priority in bidding for labor to certain industries considered most essential to the prosecution of the War. The Department also operates 100 labor agencies throughout the country which co-operate closely with 114 state and municipal agencies and give particular attention to the prevention of unnecessary movements of labor from place to place, and particularly the transportation of men for long distances.

The employment of women is not a solution of the labor problem from the standpoint of the wood preserving industry, except in so far as they can be used in office work. Considerably more may be done, however, in utilizing the service of boys of high school age for light labor.

The remaining remedy for the labor situation is the further use of labor-saving equipment. Considerable success has been experienced in the use of locomotive cranes for the handling of ties, while the developments of other labor-saving devices in this field is highly desirable at the present time.

Not only is it difficult to secure laborers at the present time, but it is hard to keep them. Commercial timbermen have been able to bid higher than railroads for labor, with the result that there has been a demoralization of the market. There is one way of keeping labor without further increasing wages and that is through further attention to the comforts of the men. Such a simple device as a shower bath is very attractive to men handling "black" ties. Comfortable quarters, sanitation and good food at labor camps are strong inducements for the men to stick to their jobs.

In considering the labor problem it should be remembered that the present labor shortage may continue indefinitely after the War and that improvements introduced now may justify themselves as permanent qualities.

DISCUSSION.

C. M. Taylor (P. & R.) stated that the speaker had omitted mention of one source of supply, namely, the Portuguese, Spanish and Finnish sailors, who spend considerable time at our ports waiting for their ships to sail. He said his labor was almost entirely made up of these transient aliens. With reference to the supply of negro labor, he stated that their importation to the North should be discouraged as opposed to the economic and social welfare of that section of the country.

J. H. Waterman (C. B. & Q.) disagreed with Mr. Taylor's views on negro labor, asserting that under present conditions anyone who could handle a tie was in demand and that the South should not have a monopoly on the negro. On the subject of labor-saving devices, he said that while locomotive cranes were invaluable in a tie yard, the price of cranes had risen from about \$8,000 a few years ago to \$20,000 at the present time. In other words, both the cost of labor and machinery is high.

William A. Fisher (Michigan Wood Preserving Company) described the operation of a monorail crane used by his company which is capable of handling a train-load of ties every two or three minutes. George E. Rex (A. T. & S. F.) said that he was using five cranes

at the present time and found that they cut the cost of handling ties in two; in fact, without them he would not be operating to-day. F. J. Angier (B. & O.) said that he had been permitted to purchase a crane with the understanding that it would pay for itself within a year. Records kept for the first month showed that the crane had saved \$746 in operating cost, and on this basis would more than cover the \$8,000 which constituted the original cost of the machine.

A. L. Kuehn (American Creosoting Co.) stated that his company had found that the cost of handling "black" ties could not be reduced materially by locomotive cranes. However, untreated ties are received in the yard in closed-top cars, necessitating the use of practically the same number of men to move the ties from the ends of the car to the door and to arrange them in piles in the yards as when cranes are not used. The only advantage in the crane is in doing the heavy lifting work, thereby enabling the company to make use of a somewhat lower class of labor than when all the heavy work must be done by the men.

President Foley cited objections raised to the bonus system because of the disproportionate relation between wages earned by the men under the bonus system and those in other departments on a straight wage. He also called attention to the urgent need of the nationalization of any foreign workmen employed. He outlined the efforts made at the treating plants of the Pennsylvania Railroad to teach the new men the principles and ideals of our government. This led to the suggestion by M. K. Trumbull (National Lumber & Creosoting Company) that material assistance along this line could be obtained by those concerned with this problem through co-operation with the National Americanization Committee of New York.

S. R. Church (Barrett Company) told of the efforts of his company to hold men through a bonus system, whereby a man was paid a bonus, based on length of service; this premium being given to the man at the end of the year. The plan was not an entire success, since only 65 men out of a force of 250 returned to work after the bonus was paid them. Mr. Rex related a similar experience with negro laborers after the payment of a six months' bonus.

Commenting on Mr. Foley's statements as to the bonus system, Mr. Waterman demonstrated that the real cost of labor is the cost per unit of work done, not the cost per man, and cited repeated instances of the performance of men unloading cars or loading them when paid under the bonus system. Mr. Howson suggested that the payment of premiums for the purpose of encouraging permanent employment could be carried out more successfully by paying the men a small increase in rates after a certain period rather than a lump-sum bonus.

CONDITIONS IN THE TIE MARKET

The discussion of this subject was opened by M. T. Shanese (N. Y. C.), who said in part as follows:

"I have spent the greater part of the past six months in looking into conditions in the tie-producing fields of several different states and find that, owing to the past and present heavy demands for forest products, the supply is diminishing to a noticeable extent. Under prevailing inadequate transportation facilities and adverse labor conditions, it is a most complicated situation. Labor is the most serious problem. Attracted by the higher wages being paid in the northern cities, there has been, for a few years past, a constant migration of both white and colored laborers from the tie and timber

producing fields, and our entry into the War has, of course, had its effect in reducing the labor supply.

"At no time have we experienced such conditions, and the fact is being each day more firmly established that labor is the standard of all values. As an illustration of this, one may possess vast acreage of the most choice standing timber, but unless it is possible to secure labor to manufacture it into the finished product, it is of very little value. Under normal conditions some tie contractors purchase most of their ties from the natives in the many states in which they are produced, being able in this way to take care of their requirements. Under this condition the greater number are hewed ties. So many native tie makers have answered the nation's call that there is sure to be a great shortage of them, emphasizing the necessity for producing a great many more sawed ties, which will, of course, make it necessary to resort to the use of a great many more portable sawmills. The greater portion of the production will have to come from manufacturers who own their stumpage and who will be forced to attract labor for the manufacture of ties.

"Owing to certain kinds of freight being embargoed to give preference to the movement of essentials, the non-essentials are being allowed to accumulate. Ties cannot be considered non-essential at any season of the year, particularly when the enormous demands are considered, it being necessary to keep them moving at all times so as to have them available for use when needed.

"Considering the large tie requirements and their absolute necessity, I am satisfied that the problem can be solved to some extent by securing greater efficiency from the available supply of labor."

Mr. P. R. Walsh (Walsh-Griffith Tie & Timber Company) gave a brief review of the conditions imposed upon the tie producer under the current shortage of labor and the high prices of all materials used. The shortage of ties is increased through a demand for lumber of small sizes for which tie timber is entirely suitable. As a consequence, the portable sawmills are now being used largely in the production of this lumber. The mules used in hauling ties are being bought up by the government agents, so that tie producers are confronted with the possibility of using motor trucks. He intimated that the railroads ought to raise their prices and be more liberal with their specifications.

W. H. Clifton (B. & O.) said that there were not enough ties in the east to meet the requirements and that he was now compelled to cover a much wider area in order to procure the necessary ties. He said there was a very definite limit to the amount that a railroad could pay for the ties, but that this limit had been extended repeatedly during the last year.

F. S. Pooler (C. M. & St. P.) said that the railroads could help the tie situation materially by reducing their requirements and cited his own road, which had reduced the tie renewals for 1917 by 450,000 from the original estimate, and that it was the idea this year to secure just enough ties to make as many renewals as were made last year. This reduction was made partly because of an inability to secure enough laborers to put the ties in the track.

A. R. Joyce (Joyce-Watkins Company) said that the production in Upper Michigan, Wisconsin and Minnesota was less than 50 per cent of normal and that practically all of the ties produced in this region are now being consumed by the railroads passing through it, with the result that roads outside of the territory get but few of them. There was also some discussion of the situation in Canada, which is manifestly worse, and of

the need of keeping ties in track just as long as it is safe to do so. J. H. Waterman (C. B. & Q.) commented on this to the effect that it was the prime purpose of this association to keep ties in the track just as long as possible by preserving them properly. He stated that the life of ties in some cases was appallingly low and cited instances of an eastern road maintained to a high standard where the life of the ties was less than five years. A. L. Kuehn (American Creosoting Company) said that the railroads were increasing the life of their ties and cited the testimony of four engineers maintenance of way on roads that have been treating ties for the last 10 years. They all said that the results were very encouraging, one of them claiming that it would be possible to defer tie renewals for two years with entire safety. Mr. Pooler told of the efforts being made on his road to reduce tie renewals by co-operation between his department and the roadmasters. Through re-examinations of the ties marked for renewal it has been possible to defer the removal of the ties in many cases.

CAUSES AND PREVENTION OF FAILURE IN CREOSOTED WOOD BLOCK FLOORS

By L. T. ERICSON,

Contracting Engineer, Jennison-Wright Company, Toledo, Ohio.

Creosoted wood blocks are rapidly becoming recognized as the ideal material for floors. In spite of occasional failures of floors of this type, architects and engineers are specifying their use in increasing quantities every year. Our problem to-day consists in the elimination of the occasional failures, and it is one of extreme importance. They are sometimes rather difficult to analyze on account of the extremely variable conditions.

A general rule cannot be laid down which will fit all conditions, but certain general facts and rules can be established which will be of great assistance in preventing trouble, even though the conditions met vary from those originally anticipated. Floors of this type very seldom fail from decay. The blocks, if properly manufactured and treated, and properly installed, wear indefinitely, but when the floors do fail eventually, it should be from wear alone. When premature failure occurs it is usually either from undue shrinkage of the blocks, causing them to become loose, or from expansion, causing the floor to buckle. Floors subjected to considerable humidity or moisture fail very frequently for the latter reason. In the first case, when the blocks become loose foreign matter soon sifts between and under them, making the floor rough and uneven. The blocks then have a tendency to travel with the traffic, and as they get out of level, soon broom on the ends and break up. This condition also permits water to get under the floor, which will aid very materially in the second usual cause of failure, viz., expansion. Expansion at this stage will cause the floor to buckle because the joints are full of incompressible dirt and foreign matter.

In relaying the floor after the blocks have buckled, it is a difficult job to restore the original surface. Discrepancies of this kind hasten the splintering of the blocks and destroy the smooth and even surface so desirable and necessary for service and comfort. Expansion joints, an inch or thereabouts in width, should be always placed along all walls and around columns, machine bases, etc., wherever they can be of benefit. However, expansion joints of this width cannot be placed across the traffic without causing depressions and rough spots in the wearing surface. Inasmuch as creosoted blocks have been

known to expand five per cent of their volume in passing from the dry to the saturated state, it is obviously impossible to take care of expansion as a general proposition, successfully, merely by means of expansion joints along the walls, columns, etc., where variable conditions of moisture exist.

The logical and practical way to take care of this expansion is by laying the blocks with individual expansion joints between each and every one and filling the joints with a compressible and waterproof material. In rectangular blocks, most of this expansion occurs on the ends. The width of end joints required can be calculated very closely, and when this is done and the requisite provision made, as above, no further danger will be encountered from expansion.

Taking it for granted that the proper treatment has been specified and given, there are three very essential details which must be observed to insure success: Thoroughly air-seasoned lumber (for all dry or semi-dry conditions), an absolutely stable foundation, and a bituminous filler between the joints.

AIR-SEASONED LUMBER.

It is necessary for success and long life to keep the blocks tightly cemented together. One of the most essential requirements in this connection, especially where dry or heated conditions are to be encountered, is that the lumber shall be absolutely air-seasoned. Inasmuch as untreated lumber will contract more than six per cent in volume in drying from the green to the dry state, it should be apparent that there is no possible way to keep blocks tight in the floor if any such condition of shrinkage is to be encountered after their installation. Floors that are to be constantly subjected to moisture or to humid conditions are an exception to this rule. They should be preferably manufactured from only partially seasoned lumber, or if dry lumber is used it should be subjected to live steam to swell the blocks during the treatment. This condition, however, is not a usual one.

This brings up the allied subject of proper handling of the blocks after they are treated and before they are installed in the floor. If they are allowed to be hauled or stored out in the open and subjected to rain, snow or ice, and then not dried out preliminary to installation, you may be pretty sure that they have absorbed considerable moisture, thereby expanding, and that later undue shrinkage is apt to occur. Likewise blocks intended for wet places that are allowed to dry out after treatment are liable to cause buckling troubles after they have been installed.

STABLE FOUNDATION.

Concrete of the requisite depth and proportions to withstand the load to be imposed should always be used unless out of the question from other standpoints. If timber is used, it should be given a preservative treatment to avoid decay. However, it is very rarely the case that concrete cannot be used.

The advisability of the use of a cushion between the concrete and the blocks is a matter of much debate. It should be remembered that when one is used its sole function is to level up the inequalities of the concrete base, to afford the blocks an even bearing and to permit them to be surfaced smooth by rolling or tamping. In a great many cases the use of a cushion is necessary for this latter reason, especially if a smooth finished floor is desired. Most specifications permit a variation of $\frac{1}{8}$ in. in the depth of the blocks, and this variation is very likely to occur even when the blocks are cut by the

latest approved types of block machines. A cushion will take care of this variation in the depth of the blocks.

Floors frequently fail from shifting of the cushion. For that reason it is advisable to use one composed of dry mortar and it should not average more than $\frac{1}{2}$ in. in depth. The concrete in this case should be finished level and even enough so that the depth of the cushion will not vary more than $\frac{3}{4}$ in. It should not be over 1 in. in depth at the maximum point, nor less than $\frac{1}{4}$ in. at the minimum. It should consist of one part cement and four parts sand, thoroughly mixed and spread fairly dry. Care should be taken to see that it is distributed evenly and densely. Enough water should be sprinkled over it, just ahead of laying the blocks, to insure the setting of the cement.

Where the expense and trouble is not too great, where moisture under the floor is to be expected, or where the traffic is unusually heavy, it is good practice to finish the concrete to a smooth and level surface exactly the depth of the block below the finished floor level, not allowing for a cushion. This is also good practice where the depth of the block used is less than 3 in. Care must be taken to see that the base is absolutely smooth and true in surface. Blocks, laid directly on the concrete, cannot be tamped and require an even bearing, to prevent them from splitting under traffic.

BITUMINOUS JOINT FILLER.

More floor failures can be traced directly to the use of sand as a joint filler, or to the use of no joint filler whatever, than to any other cause. The necessity of using a bituminous joint filler is fully as important as the two preceding requisites. Its use is absolutely necessary, to cement the individual blocks rigidly and tightly in place, under the varying conditions of moisture to be encountered. As long as they are so held in place, there is absolutely no doubt as to the service which will be obtained therefrom. They will soon bind together into a monolithic mass, which will wear indefinitely. It is then impossible for dirt, foreign matter or moisture to get underneath, and such a floor is immune to sprinkling or accidental flooding with water. In other words, it is more or less waterproof.

Care must be taken to see that the filler used in the joints is of the proper melting point. It should not become soft under the temperature to be encountered; otherwise it will have a tendency to flow underneath and be of no further use. Under ordinary conditions the proper melting point is between 145 and 150 deg. F. Where abnormally hot conditions are sure to be encountered it should have a higher melting point. Placing a small amount of sand or dry cement grout in the bottom of the joints is a very good means of preventing the filler from flowing underneath, but care should be taken to see that too much is not used.

Either coal-tar pitch or asphalt may be used. Coal-tar pitch is usually advisable, both on account of being more easily obtained and being better adapted for the purpose. The great difficulty to be encountered, in connection with the use of bituminous joint filler, for a floor to be subjected to dry conditions, is the fact that the blocks must be laid as closely together as possible. That condition makes it very difficult to introduce the filler into the interstices in sufficient quantity and to their full depth. The filler should be heated to the point where it is thoroughly liquid and it will flow like water. It should be flushed into the joints from the top, using a hard rubber-edged squeegee to force it into the interstices and to leave only a light film on the surface. After the joints have been properly filled, the surface

should be covered with sharp, dry sand and the sand permitted to remain, if possible, for a period of three or four weeks. The light film of bituminous filler left on top will, if of the proper melting point, be worn off and into the surface by the traffic within that time. If any surplus remains when the sand is removed, and it proves soft and obnoxious, it can be removed by means of hot sand or hot irons.

DISCUSSION.

Walter Buehler (Barrett Company) emphasized still further the necessity for a distinction between interior wood block floors subjected to different kinds of service and that the blocks to be used in dry interiors must be handled differently than those which will be subject to wetting or high humidity after being laid.

THE CREOSOTE SITUATION

R. Esau (Barrett Company) gave an informal talk on the available supply of creosote. In so far as the domestic supply is concerned, the chief difficulty at the present time is that the coal shortage has resulted in the extensive use of coke-oven tar as a fuel, it being estimated that the present consumption in connection with steel manufacture is at the rate of one and one-quarter million barrels per annum. From one source of supply alone, only three per cent is now available for reduction, the rest being burned. Three or four years ago it was the opinion of those connected with coal-tar products industry that the great supply of this material would be a serious problem to the producer and manufacturer because of the difficulty of securing an adequate market. The present conditions present the absolute reverse of this situation. The shortage is acute. As a forecast, it was believed that the production of creosote for 1918 would be less than 1917.

E. B. Fulks (American Tar Products Company) confirmed Mr. Esau's statement in that the best to be expected was a production in 1918 approaching that of 1917, with the difference that with the beginning of last year a surplus of 12,000,000 to 15,000,000 gal. of creosote was on hand, whereas there is no such supply at the present time. G. A. Lembcke (Lembcke von Bernuth Company) gave some information concerning the supply of foreign creosote. Aside from the embargo placed by the British government on the exportation of this material, coal-tar is now being used for fuel in England, even to the prohibition of its use for many other purposes. Following the close of the War a large supply of creosote should be available from England because of the conversion of coke ovens. Transportation will be the most serious problem, since the shortage of ships enters into the situation.

OTHER REPORTS

The report of the committee on service tests was presented by P. R. Hicks, chairman. This consisted of a statement of the progress being made in the selection, compilation and tabulation of data on the life of untreated ties and those treated according to various processes.

The condition of creosoted wood block pavements in Mobile, Ala., Shreveport, La., and a number of Texas cities was the subject of a paper presented by C. H. Teesdale (Forest Products Laboratory), who had been commissioned to investigate certain failures of pavements in these cities, the conclusion being that poor practice, particularly as to laying and fillers, was primarily responsible.

Volume Temperature Correction for Creosoted Oil Measurements was the subject of a paper by F. R. Church (Barrett Company) and J. M. Weiss, which was presented by the former. The report of the committee on Terminology was presented by the secretary and consisted of a glossary of the technical terms used in the wood preserving industry. It was suggested that criticisms or additions to this glossary be submitted to the chairman of the committee.

Dr. Herman von Schrenk gave a brief talk on the effect of the war on the supply of timber of various sizes. Between July and September the consumption of wood in this country was carried on at a scale far beyond previous records. The construction of the cantonments entailed the cutting, manufacture and shipping of lumber at most remarkable speed, and while this work interfered to a considerable extent with the available supply of lumber for other purposes, the situation is not nearly so serious as that produced by the ship-building activities, which demand the use of all available mills and men. Because of the need for a large amount of material of certain sizes embargoes have been placed on the shipment of timber for other purposes than ship building of all yellow pine thicker than 2 in. or wider than 10 in. in any lengths, and of all Douglas fir in 12-in. by 12-in. sizes and larger. However, in any case where use of material for other purposes than ship building can be shown as a definite need it has been found possible to obtain the release of the necessary material by application to the special branch of the Council of National Defense, or through the lumber associations.

The committee on non-pressure treatments, R. A. Griffin, chairman, presented a synopsis of the various methods of treating timber without the application of pressure. The methods are classified as: brush, dipping, hot and cold, kyanizing and Boscherizing. The first three are ordinarily carried out with the use of creosote. The brush treatment implies the application of the liquid in thin layers with a brush. The dip treatment involves a temporary immersion for a period of 5 to 15 min. In the hot and cold process the wood is immersed in oil at the temperature of 200 to 230 deg. F., to be followed by an immersion in oil of atmospheric temperature, the contraction of the air and moisture in the wood cells tending to draw the oil into the wood. The kyanizing process implies the immersion of the timber in a 1.0 per cent solution of mercuric chloride. The time of immersion in days is determined by the formula $n + 1$ where n is the thickness in inches. As the solution attacks iron, it is necessary to use wood or concrete vats. The Boscherizing treatment covers the use of various metallic solutions and has been applied principally to piles and poles.

The committee on Wood Block Paving and Floors presented specifications for wood block floors for interior use, designating an "interior wood block floor" as one made for a heated or constantly dry room, not subjected to moisture or very humid conditions.

A paper on Fire Prevention and Protection as Applied to Wood Preserving Plants was presented by J. G. Hubbell, manager, National Inspection Company, and will be published in a later issue.

OTHER BUSINESS

At the closing session on Thursday, the following officers were elected for the ensuing year: President, M. K. Trumbull, vice-president, National Lumber & Creosoting Company, Kansas City, Mo.; first vice-president, J. B. Card, president, Central Creosoting Company,

Chicago, Ill.; second vice-president, A. R. Joyce, Joyce-Watkins Company, Chicago, Ill.; secretary-treasurer, F. J. Angier, superintendent of timber and treating plants, Baltimore & Ohio, Baltimore, Md.; members of the executive committee, E. B. Fuls, vice-president, Ameri-

can Tar Products Company, Chicago, Ill., and E. T. Howson, editor, *Railway Maintenance Engineer*, Chicago. It was voted to hold the next annual convention at St. Louis. The annual dinner was held at the Hotel Sherman on Wednesday evening.

Operating Details of the Bonus System*

BY W. C. NISBET

THE FOREMEN who stand the highest in the standard time and bonus system are nearly always among those having the best track on the subdivision. In many instances the foreman who has the best track has the highest percentage. The reason for this is that the same display of intelligence which enables a foreman to put up good track also teaches him to plan his work to good advantage, utilize his men's services to the utmost, and avoid unnecessary work, all of which assists in producing a high percentage. It also follows that a foreman who maintains good track over his entire section must have a faculty for rapid as well as effective work.

VARIATION IN GANG STANDING DUE TO INTERRUPTIONS

As the same standards are in use over the whole road it is necessary to provide some means of relieving the unfairness due to variation in the delays incident to traffic, etc. Also it is customary in track work to go to work and return on company time, hence a gang whose headquarters are at one end of or off its section cannot accomplish as much as one whose tool house is near the center of its section. Both of these features are conveniently covered by giving every section a "delay percentage," based on the average lost time due to getting out of the way of trains, going to and from work and other legitimate delays.

This percentage is arrived at by finding out from train sheets or other data the average number of minutes per working day for some period the particular section gang under consideration is delayed by trains and adding to this the time necessary to go from the tool house to the average working point on the section and return. The result may be, for instance, a total of 60 min. per day, or 10 per cent of the total working minutes in 10 hours. This percentage is used as follows: For each item of work done the standard time is arrived at in the manner previously described (multiply the number of items of work by the standard time for that item). The actual time used is the hours reported for doing the item of work, less the delay percentage. The performance percentage for the job or day is the standard hours divided by the actual.

For example, suppose a gang consisting of a foreman and 5 men work a 10-hour day applying tie-plates, for which the standard time is 4 min. each. Their delay percentage is 10 per cent and they put on 750 during the time available.

Standard Hours.	Actual Hours.
$750 \times 4 \text{ min.} = 3000 \text{ min. or } 50 \text{ hr.}$	$6 \times 10 = 60$
	less 10% 6
	54
Standard $\frac{50}{54} = 93$ per cent performance for the day.	

*This is the fifth and last of a series of articles on "The Application of the Bonus System to Maintenance Work" which have appeared monthly, starting with the October, 1916, issue.

When only a part of the time, say, 50 per cent, is worked on jobs covered by standards, the performance per cent is computed by dividing the standard hours earned by the actual hours worked on standards and the result indicates what bonus percentage to use. In this case, however, the bonus percentage will apply to but 50 per cent of the wages earned, as it would not do to assume that the gang earned the same percentage for the whole period where there was no way of knowing this to be the case. If a gang works a whole pay period on work for which standards are set its performance per cent is computed by dividing all the standard hours by the actual hours. The bonus per cent will then apply to all the working hours.

It is clear that it is to the advantage of all concerned to have as much as possible of the track work covered by standards, either permanent ones or temporary ones set by the roadmaster.

In order to make it to the roadmaster's benefit to set these standards freely, it is well to offer a bonus to him, based on the percentage of work which he schedules to what he may schedule. This gives a performance per cent from which a bonus per cent may be taken out of the table and the latter multiplied by his wages to give the proper addition thereto.

The roadmaster's bonus is not an essential part of the system, but it has proven of value where used. The extra \$10 or \$15 per month which he can earn in this way makes him take much more interest in the standard time system than would otherwise be the case and is well worth the cost in making it possible for the foremen and gangs to have standards on nearly all jobs, so that their bonus will apply to the most of their earnings.

HOW THE MEN ARE AFFECTED BY BONUS EARNINGS.

The system allows a gain in pay to good gangs of often 20 to 25 per cent of their wages. This makes it easier to get and hold men and gives a welcome opportunity in normal times to pick and choose in hiring men. It has frequently happened that the men have complained that one or two of the gang were not doing their share of the work. In a gang of negroes this happened and some of the men came up to the foreman after work and asked him to get rid of two of the gang and in their places get "some working niggers." Without bonus payments the men do not care if there are shirkers in the gang. By the way, this gang led the list on its sub-division. Foreigners are also readily interested and understand the elements of the system better than might be supposed.

The writer was once talking to a foreman during the noon hour while some of the gang were eating lunch near by. Later one of the men, who could barely speak English, came up and asked, "What bonus does 92 per cent pay?" The rail-laying gang shown in the list in the previous article as making the best performance, laying 160 100-lb. 33-ft. rails with 22 men, was working for

the bonus. The men were Macedonians, with an Italian foreman, and few of them could speak English.

Different observers have witnessed that the men get back to work quicker after trains pass, don't stop work to "look at the scenery" so much and generally take more interest in getting the work done. Foremen and gangs are found who respond to the combined stimulus of competition and bonus payments to the last degree and the results shown are startling as to the possibilities of energetic men when well directed. Occasionally some have to be restrained to prevent them from hurting themselves.

The performance of a gang of native Americans surfacing yard tracks in the hot weather of the summer of 1916 was noted, which the writer believes would seldom be excelled. There were four men with the jacks, followed by four men tamping, and the ninth man dressed the ballast. Their progress was at the rate of three ties per minute. The roadmaster considered the quality of the work this gang did to be satisfactory and said he wished he had more like them.

The results of the work of each gang can be tabulated readily for the month to show the performance per cent for each class of work. These figures can be made of great value, as they show in what respects each gang did well or ill. Progress from month to month can be seen by comparing these monthly reports.

Without such records based on accurate uniform standards the checking up of the work of different gangs cannot be rated higher than guess work. The sole criterion then is that such and such a section has good track and another is falling down, when perhaps these conclusions do not represent the true situation in any respect. To judge performance of any kind a standard or measure is essential. With such a measure, supervision can attack the weak spots and get results.

THE WORK OF THE TRACK INSPECTOR.

The arrangement of the day's work of the roadmaster's assistant or track inspector depends on the train service available, for he should spend most of his time on the road, reserving two or three hours a day for recording the results of the gangs. The frequency with which he should visit each gang depends again upon the kind of work it is doing. A gang laying rail, raising track continuously or putting in ties steadily, needs to be seen only once in several days to note the output since last time and the conditions under which the work was done, the number of ties spaced if rail is laid, the kind and depth of ballast, etc., if raising track or installing ties. The results should be noted carefully and the foreman's daily reports checked for quantity. The other data is needed to know which of the schedules is to be applied to the work.

If a gang does different kinds of work or changes its program frequently, the inspector should see and check the results each day. Everyone concerned should be assured that there is a reliable double check on the quantity and quality of the work done.

Most motive power departments operating on incentive systems in locomotive and car repair shops provide a competent machinist at about \$100 per month as an inspector on quantity and quality for every 40 to 50 workmen, and sometimes clerical help in addition. The work of the maintenance of way department is just as necessary and demands as good supervision. It may require one inspector for each roadmaster, or it may require more. The principal demand is that the work shall be competently performed so that all foremen, trackmen and engineer officers can have confidence that

the comparative standings and bonus percentages are accurate.

The inspector should work under the direction of and naturally in closest harmony with the roadmaster. He should keep the latter informed as to the performance of the gangs from day to day and any unusual or irregular feature he notices. Naturally he can be of much assistance to the roadmaster in increased supervision and other work aside from bonus matters. The roadmaster should note the quality of the work done, holding all gangs to a uniform standard in this respect. In the beginning there may be one or two cases where it will be necessary, for the sake of discipline, to require a foreman to do some job like surfacing over a second time, with no credit for his standard hours. It will rarely be found necessary to repeat this.

CLERICAL FEATURES.

It is possible to combine the regular accounting work for the I. C. C. reports done usually in the division offices with the record-keeping of the standard time and bonus system. Inasmuch as one of the essential features of the system is to have daily records of gang performance for the roadmaster, it will be necessary to have this accounting work done in his office. The records used, however, can be prepared with the requirements of the I. C. C. accounting rules in mind so that one record will answer all needs and thus avoid unnecessary duplication.

The form used for recording the performance of a gang should be long enough to show a month's record and wide enough to give room for a list of all the principal track operations, allowing each item two columns, one of standard, and the other of actual hours.

The totals for each heading for the month will then show the total standard hours and the total actual hours. Dividing the former by the latter gives the performance in that item of work. For these numerous divisions the slide rule is a time saver. It is also a great help in figuring standard hours from the foreman's reports where such problems as the following are common:

"736 tie-plates put on." If the standard is 4 minutes per plate, to get the hours, divide 736 by 15 (736×4)

60

Such divisions are done very quickly on the slide rule, but are rather laborious otherwise when many have to be done in succession. A special slide rule for the particular computations necessary under each kind of track work can be made, but the writer's experience with this was that its use saved no time over the ordinary slide rule.

TRAINING OF GANGS TO BRING UP THEIR PERFORMANCE.

After such a system as has been described in these articles has been in operation for five or six months the positions of the gangs will be more or less fixed. Some of those known to be among the best will be occupying the places in the upper part of the list with standings of from 80 to 100 per cent. The rest of the list represent the greatest possibilities for gain to the railroad, and furnish a wonderful opportunity for improvement by training and general supervision.

It is now known accurately from the records which gangs need help and in what items they are weak. Many foremen known to be reliable and considered valuable men have worked on but a single section and their methods of work will sometimes be found to be faulty, or they may lack the capacity to get the best work from their men. Other foremen may have other faults. Improvement is possible in many cases.

Frequently the foreman with low monthly standings is found to be discouraged, thinking the standards are unfair or impossible of attainment and laying the blame for his standing on them. A roadmaster who has been most successful at this work endeavored to spend a day with those foremen whose performance was below his own standard, which he set at 80 per cent, and he either took charge himself or gave the foreman some needed advice about the method of going about the work, the arrangement of the men, etc. At the noon hour he would figure up, for the foreman and his gang, what had so far been done and the percentage made, which would usually be quite satisfactory. He would explain how much bonus this paid per month to each man in the gang who worked full time and ask them if they would like this amount over their regular pay, also if they felt overworked and if they could do as well continuously. It was not difficult to work up considerable enthusiasm, and in nearly all cases an improvement in their percentage was seen in the month's report and also in the bonus earned, which in turn is a further encouragement to continued improvement.

After a foreman has made and spent his bonus for a few pay days he has found a place for the money and is not satisfied to do without it. He will proceed to train his men of his own accord and will frequently develop surprising energy and initiative.

Finally, it is undoubtedly true that the system described calls for more thought and a higher grade of supervision generally than the common methods. Such a requirement may be considered an advantage. Further, it is not beyond the capabilities of the average man and the possibilities of gain are so great and the working to standards is of so much added interest that the adopting of the proposed method will be a source of satisfaction to everyone concerned.

WAR BONUSES.—The British Government has granted another war bonus to railway workers, the fifth since the beginning of the war. The new bonus amounts to six shillings a week, bringing the total increase since February, 1915, to 21 shillings a week. The average pre-war wage was 31 shillings. The bonus to boys is increased to 10c. 6d. a week, while women and girls receive 8s. and 4s. 9d. extra a week, respectively.

QUESTIONNAIRE ON IMPROVEMENTS

DIRECTOR GENERAL OF RAILROADS McAdoo has addressed a circular letter to the roads under date of February 2, calling for complete information regarding new equipment, additions, betterments, extensions, etc., already contracted for or which are considered necessary for 1918. In determining the work which should be done and that already started which should be suspended, the roads are asked to be guided by the fact that it is important to avoid the necessity of raising any new capital which is not absolutely necessary for the protection and development of the required transportation facilities to meet the present and prospective needs of the country's business under war conditions. It is likewise highly important that the available supplies of labor and material shall not be absorbed except for necessary purposes. Attention is also called to the fact that projects which might be regarded as highly meritorious and necessary when reviewed from the standpoint of an individual company, may not be equally meritorious or necessary under existing conditions when the government has possession and control of all railways and when the facilities of the separate companies are now available for common use.

The roads are asked to give information concerning (1) additions and betterments calculated to increase the capacity, efficiency or economy of the road with descriptions and estimates of cost and of the time required for completion; (2) additions and betterments which the management thinks should be made during the present calendar year and which do not come under class 1 with similar information; (3) extensions of existing lines with information concerning the purpose of the extensions and whether the territory to be reached is already served by other lines. Information is also asked regarding additions and betterments and extensions inaugurated prior to December 28, 1917, and which have not been completed, showing (1) the amount authorized and expended and the distribution between operating expenses and those chargeable to investment account; (2) that part of the work which could be suspended without detriment to the carriers' capacity; (3) those projects which the management believes should not be suspended and the reasons therefor.

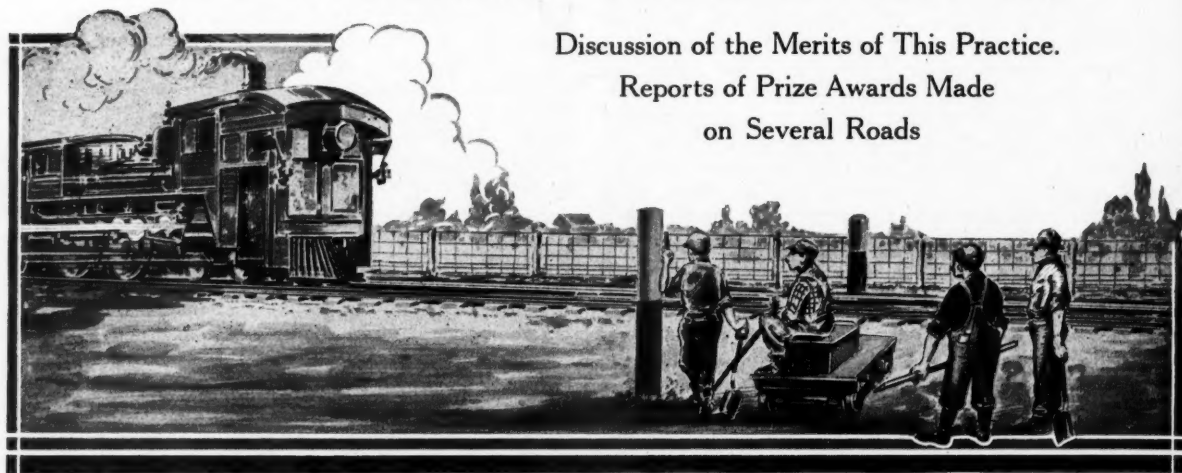


BALLASTING A LIGHT RAILWAY BEHIND THE LINES

TRACK INSPECTIONS CREATE RIVALRY

Discussion of the Merits of This Practice.

Reports of Prize Awards Made
on Several Roads



THE CONDUCTING of annual track inspections and the awarding of prizes for good track and for special effort in improving sections has been followed for many years on a number of roads, notably the Pennsylvania. Those roads which have gone into this practice most thoroughly are following it from year to year, finding that it is a means of creating rivalry

and interest in track work and that the results secured are large in proportion to the expense incurred. The discussion which is published below presents the advantages of this practice from the standpoint of an officer on a road which has followed this practice, and who is, therefore, familiar with the results. Following this are the reports of the awards on several roads.

The Advantages of Track Inspections

BY J. W. POWERS,

Supervisor of Track, New York Central, Rochester, N. Y.

IT IS ABSOLUTELY NECESSARY for a railroad track to be inspected continually and regularly by those in immediate charge. The amount of this inspection should be in proportion to the excellence of the track and the amount of traffic, but whatever the amount of traffic, all tracks should be gone over at least once each day. In addition, there should also be one annual and two or three intermediate, inspections for the purpose of awarding prizes.

It is the opinion of many who have given the matter due consideration that inspections should not be made at regular stated periods, as everyone concerned is too apt to count on this established time and to feel justified in allowing certain features of the work to go undone. Therefore, under the prevailing custom of periodical inspections now in vogue on many roads, there is too much striving for a particular end at a given time. Supreme efforts and heroic energies are often put forth as the time for inspection approaches that should have been more evenly distributed over the whole course of a season's work.

A railroad should always be in good condition, not only as a matter of safety and economy, but also as a matter of sentiment and pride; and no part of it should ever be allowed to fall below a certain standard in any respect. If in the northern states unusually severe winters unexpectedly add to the labor of handling snow and ice, shimming, etc., the riding of the track may reflect these exceptional conditions. If it becomes necessary for a management to economize in labor or material, the standard will necessarily be lowered. Should heavy

rains cause numerous landslides and washouts, rendering portions of the track almost unrecognizable, such a time of course would be inopportune for an inspection. But in the ordinary routine of maintenance the track should ride as well at one time as another. In other words, track should not be allowed to deteriorate. To do so is not scientific maintenance, nor is it based on wisdom or economy.

It is the opinion of many that, in order to secure the undoubted benefits of the prize system, the inspection should be made at varying periods without previous warning and when not expected. The prevailing condition of sections and sub-divisions would then be discovered more truly and the rewards for merit bestowed more deservedly. If it is understood that the inspection may come at any season of the year, the little defects which are sometimes neglected would receive prompt attention and track would be maintained at higher standard; thus the object of the prize system would be attained more readily.

The methods of conducting inspections on various railroads differ somewhat in the number and scope of the features considered, in the personnel of the inspectors and in the form and amount of the premiums awarded. The marking is rarely done by the roadmasters, supervisors or other officers whose work is undergoing examination or who may possibly benefit by the result. It should be and is usually done by superior officers, qualified by their position or experience to pass judgment on the different features of the work, and to give due consideration to the relative importance of each feature.

Line, surface and drainage are the most essential points in good track and should be ranked above all others in consideration of merit. It has been found that a varying scale which gives to each part of the work its due prominence will produce the best results and improvements along the lines most desired.

There are some railroad managers who think such inspections are unnecessary, owing to the fact that the engineers of track, division engineers, supervisors or roadmasters inspect the track as often as necessary; as for the foremen, they are paid to do their work, and those in charge should see that they do it. Managers who have given the inspection and premium plan a thorough test are convinced of the benefits resulting from the prize system in maintenance of way work, not alone in its stimulating effects on the employees, but also in its practical returns to the railroad.

Desirable as the prize system may be as a stimulus to the section foreman and others, it is not clear to many how it is possible to arrive at a just distribution of premiums by the methods of inspection and the basis of reward commonly employed. It is inconceivable to them that any number of men, however fair-minded, capable or discerning they may be, can, as the result of a trip over long stretches of track at a speed of 50 or 60 miles per hour, pass detailed comparative judgment on the numerous sections without liability to error, for regardless of the good intentions, efforts or ability of the judges, such observation is not a thorough basis of judgment, and though it may locate the prizes, it may lack the respect of the competitors and so fail to encourage the desired results. As to the significance of the conditions inspected, granting it were possible to discover and compare the physical perfection or imperfection of the various sections and sub-divisions, is this information alone a final conscientious basis from which to draw conclusions?

There are a limited number of high-class lines in such a state of physical excellence that the conditions of the various sections are approaching such a state of similarity that it is perhaps fair to judge of the merits of the foremen by comparison alone of the physical condition of their respective sections at any period. But the majority of track mileage presents such dissimilar physical conditions that the labor and skill necessary to reach a certain state of refinement on one section may be much more or less than that required to reach a similar state on an adjoining section. It is maintained by some who have given the matter serious study that it is the general excellence of a division or a section at any time and all times that should count for reward.

What is the object of a premium system? Is it not to reward the greatest amount of the most intelligently directed labor put forth per man? And what should be the requirements? Surely not always the best section. But it should be the best section in view of both the natural and accidental obstacles encountered in maintaining it between periods of inspection. In other words, the rewards of merit should go for conditions of maximum refinement only when accompanied by equal evidence of improvement over previous conditions. This makes the task of awarding prizes justly on the average railroad very difficult. It necessitates that the judges should have the same detailed familiarity with individual conditions of maintenance of particular track under inspection as the supervisor or roadmaster whose track is undergoing inspection.

Such data is available and should be at hand for study and comparison and should consist of accurate and complete conditions obtained from careful previous inspec-

tions. Such information will enable the judges to grant the palm of merit to those who have put forth the greatest ambition, tact and labor and who have wrought the greatest improvements from prevailing conditions during a period of twelve months.

The hope of extra reward is a great factor in counteracting the dullness and discouragements of a foreman's work. It calls forth his best energies and develops his highest abilities. It engenders a healthy spirit of emulation and rivalry that tends strongly to raise the standard of the work entrusted to his care.

BALTIMORE & OHIO PLAN

The Baltimore & Ohio established a system of track inspection, including the awarding of prizes, on both its eastern and its western lines last year. Four cash prizes were offered on each superintendent's division, one for the supervisor having the best district, one for the section foreman having the best main line section, one for the foreman having the best branch line section and one for the foreman on main line whose track showed the greatest improvement. The prizes were awarded on the basis of a careful inspection by a committee composed of the engineer maintenance of way, the district engineer and the division superintendent. Each of the members of this committee graded the sections independently, the average of the three ratings determining the percentage for each section and subdivision. The sections were graded on the various items of maintenance work, to which relative values were assigned, the rating for each item multiplied by its relative value determining the percentage value for that item, the sum of the per cent values for these items determining the ratings for the sections.

The successful supervisors on their respective divisions on the eastern lines are given below:

Philadelphia Division, J. R. Malone, Havre-de-Grace, Md.
Baltimore Division, W. G. Beall, Baltimore, Md.
Cumberland Division, James Clay, Hancock, W. Va.
Monongah Division, L. T. Wilfong, Weston, W. Va.
Wheeling Division, W. C. Wright, Moundsville, W. Va.
Ohio River Division, G. M. Bryan, Ravenswood, W. Va.
Cleveland Division, L. C. Swanson, Akron, Ohio.
Connellsville Division, W. T. Metzger, Connellsville, Pa.
Pittsburgh Division, G. H. Stroppe, Etna, Pa.
New Castle Division, G. W. Huffman, Newton Falls, Ohio.

LEHIGH VALLEY TRACK INSPECTION

The results of the annual track inspection on the Lehigh Valley have recently been announced. The New York division, A. M. King, division engineer, received a rating of 97.5 per cent, the highest rating for a division. This division also received the highest rating in 1916. The Buffalo division was given second place with a rating of 95.5 per cent. All divisions were rated above 95 per cent, there being a difference of only a 0.34 per cent between the grading awarded to second place and that given to poorest division.

The track of the New York division is in charge of James Sheehan, supervisor, who attained the highest rating among the supervisors. The following supervisors received the highest ratings on their respective divisions: M. J. Greeney, Buffalo division, 96.2, the second highest rating for a supervisor's section. John Nash, Seneca division, 96.04 per cent; J. D. Smith, New Jersey & Lehigh division, 96.04 per cent, and H. F. Reilly, Wyoming division, 96.01 per cent.

The awards are made on a basis of 100 per cent, with 35 per cent each for surface and line and 6 per cent for ties. The remaining 24 per cent is made up of 6 per cent for anti-creeper, insulated joints and joint bolts

grouped under one head, and equal amounts for ballast, drainage and general appearance.

THE LACKAWANNA TRACK INSPECTION

The results of the 1917 track inspection of the Lackawanna have been tabulated and the awards made under the following regulations: Each foreman who is successful in securing the highest rating on his division is given \$100 in cash, a medal and a first prize section marker. Section foremen who are successful in winning first prize three consecutive years are placed on the efficiency list and paid \$10 per month extra compensation as long as they remain within the high efficiency required of their sections.

Beginning with 1917, the Lackawanna placed in effect new inspection blanks covering the maintenance cost of each section, indicating upon the inspectors' blanks the number of the section, its equated mileage, its equated cost per mile and its actual cost per mile, thereby allowing the inspectors to inspect the sections in accordance with their cost, as they have before them the actual cost of maintenance and the equated cost or the authorized cost per mile. Any section exceeding the maintenance cost allowed by the equated mileage is eliminated from the prize competition for the year.

In addition to the first and second prize awards, efficiency awards were made to one foreman on five of the ten roadmasters' divisions and to two foremen on other roadmasters' divisions, leaving three divisions of the ten where this special award was not made.

The east end of the Buffalo division, J. Wynne, roadmaster, received the highest rating of the year for a roadmaster's division, with a grade of 90.32 per cent. The east end of the Morris & Essex division, W. L. Madill, roadmaster, was rated second.

PERE MARQUETTE TRACK INSPECTION

The results of the 1917 track inspection on the Pere Marquette made in October, 1917, have been announced, the awards being made under the following regulations: The roadmaster whose district receives the highest grade is awarded a prize of \$100, and the roadmaster whose district showed the greatest improvement for the year is given the same amount. The foreman on each roadmaster's district whose section receives the highest grade is awarded a prize of \$25, and the foreman on each district showing the greatest improvement in his section for the year is also awarded a prize of the same amount. The inspections upon which these awards are based cover line and surface, roadbed and drainage, ballast and standard track cross-section; policing of the right-of-way and station grounds; and fences, crossings, signs, etc.

For the practical working of the inspection, committees were appointed, each of which was assigned to consider a separate branch of the inspection according to the above classifications. Each committee considering a single phase of the work during the entire trip. Each committee consisted of three officers of the operating and engineering departments, including division engineers, division superintendents, the assistant general manager and others. For the purpose of equalizing the grades of the different divisions and branches, the lines of the system have been divided into four classes, based on relative traffic and desired standards of maintenance, the first class including important main lines and the last class the light traffic branches. The equalization is accomplished by adding 4 per cent to the grades given to the second-class lines, 7 per cent to the grades given third-class lines and 25 per cent to grades the last class.

The inspection covered nine days and was headed by Frank H. Alfred, president of the Pere Marquette, and included the principal officers of the road. The award to the roadmaster whose track received the highest grade was given to Wm. Meier, roadmaster on the Detroit division at Benton Harbor, Mich. The roadmasters' prize for the greatest improvement in his district was awarded to H. Morris, roadmaster on the Canadian division at Walkerville, Ont. Prizes of \$25 were awarded to 12 foremen receiving the highest grade on each roadmaster's district, and to 11 foremen making the greatest improvement as compared with 1916.

The grade given to Mr. Meier was 91.24 per cent, while the lowest grade to a roadmaster was 85.86 per cent. Those given to the individual foremen of the 12 districts who won first prize varied from 96.6 to 90.9 per cent. Of the marks given to all the roadmasters only two fell below 80 per cent, the lowest being 74.4 per cent.

In addition to the examination of the track, the inspection trip covered signals and an inspection of station grounds and shops, shop grounds, repair tracks and engine houses, three special inspection committees being appointed to grade these special features. Based on these gradings, a prize of \$50 was awarded to the signal supervisor receiving the highest grade for the condition of interlocking and automatic signals, a prize of \$100 was given to the division master mechanic whose grounds and buildings received the highest award, and \$25 was awarded the station agent on each superintendent's division for the highest grade on station grounds.

THE ROCK ISLAND AWARD

In accordance with practice in the past, the Chicago, Rock Island & Pacific has awarded a prize of \$100 to the roadmaster on each division and a prize of \$50 to the foreman on each supervisor's district who has shown the greatest improvement in the track conditions as compared with previous years. This involved the awarding of a prize to each of 17 roadmasters and 53 foremen, the total expenditure being \$4,350. It is of interest that one of the foremen who received a prize is John Gray, a negro on the Louisiana division, who has previously been a recipient of this award and has run a close second on other occasions. The 17 roadmasters receiving prizes are listed below:

G. W. Kohn, Chicago Term. and Ill. division, Joliet, Ill.
P. J. Desmond, Iowa division, Atlantic, Iowa.
T. W. Brown, Missouri division, Trenton, Mo.
J. Dulin, Cedar Rapids & Des Moines Valley divs., Oskaloosa, Ia.
J. McNulty, Minnesota division, Waterloo, Ia.
G. H. Buseman, Dakota division, Pipestone, Minn.
A. Schumate, Nebraska division, Fairbury, Neb.
J. S. Pollard, Colorado division, Goodland, Kan.
J. A. Trainor, St. Louis division, Haileyville, Okla.
W. A. Simpson, Kansas division, Clay Center, Kan.
J. T. Ready, El Paso division, Liberal, Kan.
R. E. Herndon, Arkansas division, Little Rock, Ark.
R. T. Gollehon, Louisiana division, El Dorado, Ark.
M. B. McAdams, Indian Territory division, Haileyville, Okla.
Geo. Woods, Pan Handle & Amarillo divs., El Reno, Okla.
Geo. Wilmoth, Pan Handle & Oklahoma divs., El Reno, Okla.
Jerry O'Connor, Oklahoma & Southern divs., Ft. Worth, Tex.

RESULTS ON THE NEW YORK CENTRAL

The results of the New York Central annual track inspection for 1917, recently announced, show a general average condition of 82.9 per cent for the 179 main line section between New York and Buffalo, based on the

system of grading in force on that road. Of the 10 main line divisions, the eastern division, F. S. Hunt, division engineer, received the highest average rating, the rate being 83.2 per cent, and the electric division, F. Boardman, division engineer, was rated second with 82.9 per cent. Sub-division No. 3 of the eastern division, M. E. Egan, supervisor, received the highest rating for a supervisor's sub-division with a rate of 83.7 per cent. Sub-division No. 23 of the Syracuse division, A. M. Clough, supervisor, was rated at 83.4 per cent for second place. In 1916 these two sub-divisions received the highest ratings for the year, with Mr. Clough's sub-division in first place with a rating of 83.4 per cent, or identically the same per cent as for this year. Section No. 17, Sub-division No. 7, Mohawk division, Charles Weinkauff, foreman, received a rating of 84.8 per cent which is the highest rating given to the track under the supervision of a foreman.

The premiums paid to foremen are made to reward them for their individual efforts during the year under

the following regulations: On main line sections each foreman having the best track on his sub-division will receive a premium of \$3 per month, while the foreman having the best section on each main line division, with the exception of the electric division, will receive an additional premium of \$2 per month, making a total of \$5 per month. On branch line sections the foreman having the best yard section on his division will receive a premium of \$3 per month.

On the main line 33 foremen were awarded the \$3 premium for having the best track on their respective sub-divisions. The following foremen of main line sections received the additional premium of \$2 per month for having the best track on their respective divisions: Charles Weinkauff, Mohawk division; Mike Constantino, Eastern division; Nathan Quattrine, Adirondack division; Fred Browner, Syracuse division; William Mason, Ontario division; W. D. Burger, River division; Adelbert Foster, Rochester division, and Manuel Teats, Pennsylvania division.

Keeping Accurate Records of Materials*

BY J. T. BOWSER.

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THE METHODS OF distributing the costs of material to the various accounts, and the necessity for this distribution were discussed in a previous article. It is the purpose in this article to discuss the preparation of reports of materials on hand, used, transferred to other localities, or otherwise disposed of, to describe how these reports should be made, and outline why they are required.

In the first place, in order that a proper record may

ready discussed, are the foundation on which the records of materials on hand and used, are based.

In order that a foreman may understand just what part his reports play in keeping these records up to date so that they show the material situation correctly, a general outline of the theory on which material accounts are based will be given. For a starting point we will take the close of the business or fiscal year which has been June 30 on the majority of railroads until this year, but

REPORT OF MATERIAL FOR THE MONTH OF _____ 191

DESCRIPTION	ON HAND AT LAST REPORT	RECEIVED DURING MONTH	TAKEN OUT OF TRACK	QUANTITY		How Used and Where Shipped to	ON HAND
				Used	Shipped		
Cross Ties 1st Class Oak	No.						
" " 2nd " "	"						
" " 3rd " "	"						
Switch Ties No. 7	Sets						
" " " 8	"						

ONE FORM OF MATERIAL REPORT

be available for the information and guidance of the officers responsible for the operation of the road, showing the amount of money invested in materials and supplies on hand and not used, showing the stocks of materials on hand available for use, and showing the costs of material used, some sort of a report must be required of the employees who actually receive, use, or otherwise dispose of the materials purchased. The foreman's reports of material used, as well as the other reports al-

which is now December 31 in general. At this time, or usually a month sooner, an inventory of the material on hand and not in actual use is made by the foremen, which shows the material which has not been charged out as used. If the inventory is taken correctly the value of the material shown on the inventories, figured on the average price of each article, represents that amount of money invested in materials and supplies at that time, as distinguished from materials already used whose value represents an investment in the property or a part of the cost of operation.

Starting with this figure as the value of the material

*Previous articles in this series on Maintenance of Way Accounting have appeared in the December issue, page 381, and the January issue, page 18.

on hand, which in the maintenance of way department, is known as the "maintenance of way stock balance," the accountants charge to this balance the value of all materials purchased, and credit it with the value of all the materials used, destroyed, sold, or otherwise disposed of, so that when each month's accounts are finished the balance should represent the actual value of the materials on hand. It is from the foremen's material reports and from other reports of material used, that information is obtained from which this balance is credited with the value of the material used or disposed of, so that the foreman must report accurately the material used or disposed of, or the balance will not be correct, and will, therefore, be misleading.

Various forms of material reports are required of foremen, the commonest of which is the report which is made in the space provided therefor in the monthly time book. On many railroads a foreman is required to report only the materials used, but in a larger number of cases a more complicated, and, in the opinion of the writer, a form of report securing greater accuracy, is used—namely, a form of balance more or less similar to the form shown in the accompanying cut.

This type of report is a simplified form of the accountant's material record described above, but in which no prices or values are required, a quantity or number balance being carried for each article in common use, with blanks in which miscellaneous materials not printed in the book may be written in. A glance at this form will show that the exact amount of material on hand is obtained and reported at the end of each month, by



"AN INVENTORY OF THE MATERIAL ON HAND AND NOT IN ACTUAL USE."

adding to the amount on hand at the first of the month the amount received during the month, and deducting from this total the amount used or otherwise disposed of in this interval.

Except in large yards or on other gangs where large amounts of material are handled, a foreman should have no difficulty in checking the book record of materials on hand, with the materials actually in his possession, thus verifying his reports of materials received and used. Then if the foremen's reports of the balance on hand are correct, the totals of the materials reported on hand by the foremen should check reasonably close with the maintenance of way stock balance.

These reports of material on hand are also valuable to show the location of all materials on hand so that a

surplus or overstock may be located quickly, and the surplus shifted to supply a shortage at some other point, thus making unnecessary the purchase of materials of the particular class or classes which may be required elsewhere, and keeping the amount of capital invested in materials down to the minimum. It will be well to emphasize the importance of the foremen carrying as small stocks of materials on hand as is consistent with efficient work, so as to tie up as little capital as practicable in materials on hand, thus leaving more funds available for improvements.

With records of the various classes of materials on hand, which can be relied upon, the officers having charge of the ordering and purchasing of materials and supplies may do their work more economically, frequently postponing orders when prices are high, if stock balances show enough materials on hand to carry on the work, or buying only just what is actually required at such times.

The absolute necessity for accurate data will be seen from the foregoing, and foremen or others of whom reports of material used are required, should be very careful to show all materials used, sold, destroyed, or otherwise disposed of. Full and complete reports should always be given, showing how the material is used or disposed of, and if there is any doubt about a report being clear, it should be supplemented with a note explaining it fully. Men in the field should bear in mind that matters which seem very simple and clear to them may not be at all clear to a person in the office who has not had the outside experience of the field man, just as some of the matters which are entirely clear and easily understood by the office employee are unintelligible to the field man. For this reason spare no pencil and paper in making reports clear. If any situation or condition concerning the reporting of materials used is out of the ordinary, a full explanation will enable the office man to place the charge in the right account, even if the field man does not know just how it should go on his report.

A fruitful source of difficulty in maintaining an accurate book balance by the section foreman is the extra gang. These gangs usually use a great deal of material which has been charged to the sections on which they are working, and unless the section foreman receives an accurate report of the material used by the extra gang from the foreman of that gang it will be found impossible to make his book record balance with the amount of material actually on hand. It is a good plan to have all the materials used on each section charged out by the section foreman, no matter whether used by him or by extra gangs. Instead of having an extra gang foreman charge out the material used by him, he should be required to report to the section foreman the material used by him, and the section foreman should charge it out on his timebook and thus get credit on his book for all the material charged to his section and used on it.

Two of the chief troubles of maintenance of way accountants are the rail and the tie accounts. The various weights, sections and classes of rails, and their varying prices; and the classes, kinds of timber and methods of treatment of ties, make these accounts especially difficult to handle. Some of the troubles connected with the handling of these accounts are in no way connected with the foremen's reports, but many others are caused directly by inaccurate or indefinite reports made by the foremen.

In the first place, rails are classified by weight or section, then by grade, such as first and second quality new,

first, second and, perhaps, third class relay, and scrap. All of these classes have different prices and reports of rails used should show the class clearly, or the record of the feet or tonnage on hand, and the records of the value of the rail stock cannot be accurate. Since rail is so expensive, a few small errors on the part of each foreman may amount to thousands of dollars on one division in the course of a year.

Not only must the reports show clearly the weight and class of rail used, but they must be equally clear as to the weight and class released, otherwise the accountant may take released scrap rail into his stock as relay or



"SPECIAL REPORTS ARE OFTEN REQUIRED OF FOREMEN"

the reverse to the serious disarrangement of his figures.

These same conditions apply to the tie accounts. First, second and third class ties of the various kinds of timbers vary in price, as also do the ties given the different kinds of preservative treatments. A foreman must separate these classes carefully on his reports, or the stock figures on one class of ties may be thousands of ties over, while those in another class may be thousands under, and the money balance thousands of dollars out when checked up by the inventories.

On many railroads it is the practice to make an annual inspection of the ties in the track to determine just what ties require renewal during the year, and tie purchases are based on the figures determined by this inspection. All ties to be renewed are marked in some manner, generally by a paint spot on the rail above the tie, so that the foreman may know just what ties are intended to be renewed during the year. It is necessary very often to take out other ties on account of damage by derailment, breakage due to improper tamping and to center bound track, or on account of faulty inspection. These ties are usually required to be reported separately, so that the number to be procured in addition to those shown as needed by the inspection, and the reasons for exceeding the number allowed, may be known.

Reports of timber (bridge or building) used should show definitely the kind and quality, and whether treated or untreated, as these features greatly affect the price, and through the price the stock balance.

Second-hand materials and those manufactured in railroad shops must be reported separately from new material, as these materials are carried in the maintenance of way stock at different prices from the new materials. If no mention is made of the fact that they are second-hand or home-made articles, the accountant nat-

urally charges them out at new prices and his figures suffer accordingly.

In a discussion of material reports, as well as in nearly every other matter concerning maintenance of way accounts, the question of Additions and Betterments looms large. The Capital Account, which, as has been explained in a previous article, is the amount of money invested in railroad property, must be charged with every expenditure made by maintenance of way forces, which cannot be considered as actual maintenance of the property in its original condition. Therefore, a certain portion of the cost of heavier sections of rail, of manganese frogs, of guard rail clamps replacing guard rail bolts, or of any improved device which is used for renewals, is chargeable to the property account. In reporting such material as used, foremen should be very careful to show that an improved device or material is used, and an inferior article is released, giving the name or a brief description in each case. With this information at hand the accountant can make his charges properly. In order to insure that a distinction is made between ordinary renewals and renewals with improved materials or devices, special reports are often required of foremen.

Special reports are often required at the completion of a piece of new work, showing all the material used therein. These reports are required in order to avoid any chance of over charging or under charging material to the work. Very often several gangs may be engaged on the same construction work for several months, and through a misunderstanding as to who is to charge out certain materials, or through oversight, duplicate charges may be made, or, perhaps, a very considerable amount of material may be overlooked entirely. Therefore, the full report is necessary, showing the material required on the completion of the work, and it is used to check against the monthly charges, and thus enable any error which may have been made to be detected.

If all men were infallible and if all foremen could be counted upon to make absolutely accurate reports, all that would be necessary in the way of a material report for any purpose would be a simple statement of the material used, and the purposes for which it was used. But unfortunately this is not the case, and there must be a system of checks to guard against error.



BENDING RAILS FOR LIGHT RAILWAYS IN FRANCE

PENNSYLVANIA REJECTS SCREW SPIKES

THE PENNSYLVANIA SYSTEM has been conducting an exhaustive series of tests of screw spikes and tie plates under heavy traffic for the past eight years. The details of these experiments and the conclusions which have been reached have been made public in a report prepared by W. C. Cushing, chief engineer maintenance of way, Southwest System, Pennsylvania Lines, published in bulletin No. 200 of the American Railway Engineering Association from which the following data have been abstracted. These experiments were made under the direction of a committee of engineers from the various lines of the Pennsylvania System.

The locations selected for the experimental track were in No. 1 eastward passenger and freight track east and west of Birmingham, Pa., on the Middle division of the Pennsylvania Railroad, and in No. 1 westward passenger and freight track east of Wooster, Ohio, on the Eastern division, of the Northwest System, Pennsylvania Lines West. The tests were made on various combinations of screw and rail spikes with and without tie plates, which were of several designs.

The following are some of the conclusions reached:

Screw spikes have no advantage over nail spikes. When used with clips without tie plates, the cutting of the rail into the tie permits the rail to slip under the clip, thus widening the gage.

No satisfactory device is known for resetting screw spikes after the thread in the wood has been destroyed. When some of the screw spikes in the Birmingham experiment became so loose that they could be extracted with the fingers, some Lakhovsky split linings were applied to loose screw spikes. This device did not prove effective, as the spikes soon became loose again by turning back. The hardwood plug method, which is extensively used abroad, was next tried, but this was also unsuccessful, the spikes soon becoming loose again.

The first cost and the maintenance cost of track equipped with screw-spikes are both considerably in excess of those of track equipped with nail-spikes. The average first cost of ties and rail fastenings for 1,000 ft. of track with tie plates and nail spikes was \$1,044, while that of similar track with screw-spikes was \$1,782, or an increase of 71 per cent. The universally admitted higher first cost of screw-spike track can only be justified by a corresponding decrease in the cost of maintenance. Such a decrease was not effected in this experiment; on the contrary, the average annual maintenance cost of the nail spike track was \$338, and that of the screw-spike track \$593, or an increase of 75 per cent over that one nail spike track.

In the event of an accident destroying any considerable stretch of track, the avoidance of the delay to traffic which would be occasioned by the excess time required to make repairs with screw spikes would justify the use of nail spikes for temporary repairs, and the subsequent application of screw fastenings, with the waste of material involved, would greatly increase the cost of repairing track after wrecks.

Cow-hair pads as applied in this test have no value as a protection for the tie, as they were quickly squeezed out from under the tie plates where the traffic was heavy.

A 7-in. by 9-in. by $\frac{1}{8}$ -in. plate is inadequate for pine ties, or even for oak ties, under the heaviest traffic on the Pennsylvania Railroad, and loblolly or sap pine ties are not suitable for such traffic even with very large tie-plates. The cost of maintenance with screw spike fastenings and 7-in. by 13½-in. by ⅝-in. tie-plates is

greater than with nail fastenings and 7-in. by 9-in. by $\frac{1}{8}$ -in. tie-plates.

Tie plates when flat and symmetrical cut more rapidly into the tie at the outer edge, thus canting the rail. They therefore should be so designed as to bring the line of thrust as near the center of the plate as practicable.

In conclusion, it may be said that throughout this experiment, as elsewhere, it has been evident that there is no danger to traffic from failure of ordinary rail spikes either by shearing or extraction, and the question of securing greater holding power by the use of screw spikes is solely a matter of economy, so that in order to justify its use the screw spike must accomplish a reduction in cost of track maintenance sufficient to offset its higher first cost. This result has not been accomplished—in fact, the screw spike has not only been more costly to maintain, but also less reliable than the nail spike, and while it holds better at first, owing to its greater initial resistance to extraction, it becomes entirely loose under continued raising by the undulating action of the rail. The nail spike under similar circumstances still retains a very considerable portion of its holding power.

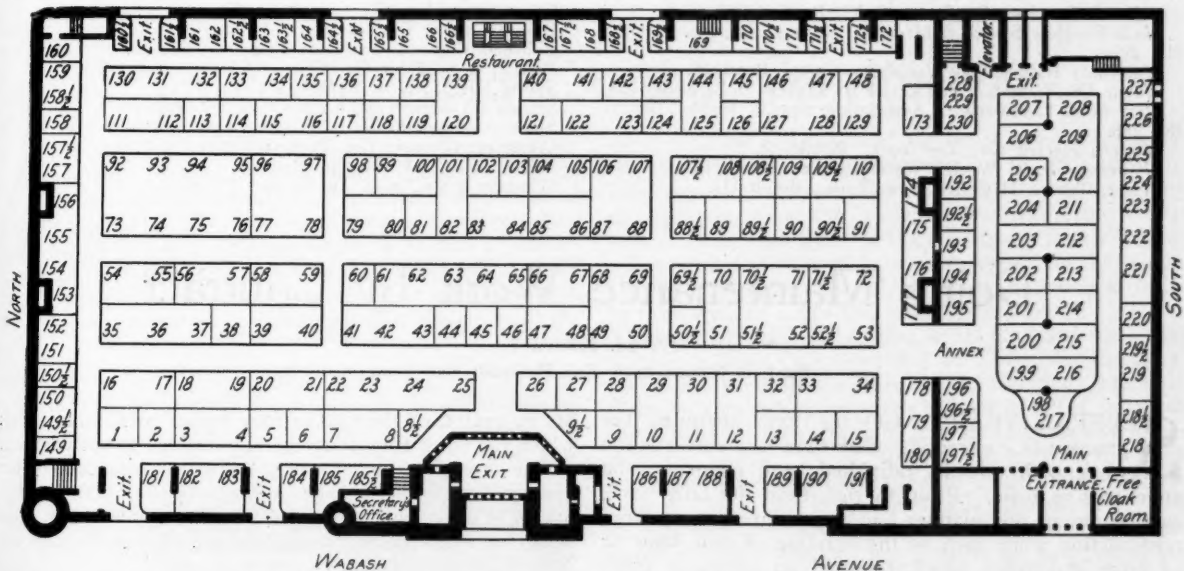
NATIONAL RAILWAY APPLIANCES ASSOCIATION EXHIBIT

WITH all space on the main floor of the Coliseum and Annex sold, the prospects for a successful exhibit by the National Railway Appliances Association at Chicago on March 18 to 21, inclusive, are excellent. Owing to a rearrangement of the floor plan and to the cutting down of some of the space allotted to the larger exhibitors in previous years, it has been possible to accommodate more firms this year than last. Emphasis is being placed on the educational value of the exhibit this year and the officers of the Association as well as the individual exhibitors are giving special attention to the preparation of exhibits which will be of this character. The firms which have arranged to present exhibits are as follows:

- Adams & Westlake Co., Chicago. Booths 87, 88, 106, 107.
- Adams Motor & Mfg. Co., Chicago. Booths 218, 218½.
- A. G. A. Railway, Light & Signal Co., Elizabeth, N. J. Booths 39, 40.
- Ajax Rail Anchor Co., Chicago. Booth 69.
- Alexander Crossing Co., Clinton, Ill. Booths 228, 229, 230.
- Alexander Milburn Co., Baltimore, Md. Booth 6.
- Alger Supply Co., Chicago. Booth 167.
- Allith-Prouty Co., Danville, Ill. Booth 184.
- American Hoist & Derrick Co., St. Paul, Minn. Booth 88½.
- American Kron Scale Co., New York. Booth 214.
- American Railway Bridge & Building Association, Chicago. Booth 226.
- American Steel & Wire Co., Chicago. Booths 51½, 52, 70½, 71.
- American Vulcanized Fibre Co., Wilmington, Del. Booth 126.
- American Valve & Meter Co., Cincinnati, O. Booths 130, 131, 132.
- Anti-Creeper Corporation, New York. Booth 192½.
- Armco Iron Culvert Manufacturers, Middletown, O. Booths 99, 100.
- Asbestos Protected Metal Co., Pittsburgh, Pa. Booth 169½.
- Associated Manufacturers of Malleable Iron, Cleveland, O. Booths 221, 222, 223, 224.
- Austin Co., Cleveland, O. Booth 150½.
- Ayer & Lord Tie Co., Chicago. Booth 225.
- Baker, John, Jr., Chicago. Booth 201.
- Barrett Co., New York. Booths 107½, 108.
- Benjamin Electric Mfg. Co., Chicago. Booths 149½, 150.
- Bethlehem Steel Co., Chicago. Booths 199, 216.
- Boss Nut Co., Chicago. Booth 169.
- Brach Supply Co., Newark, N. J. Booth 2.
- Bryant Zinc Co., Chicago. Booths 153, 154, 155, 156.
- Carbic Mfg. Co., Duluth, Minn. Booths 171½, 172½.
- Carnegie Steel Co., Pittsburgh, Pa. Booths 52½, 53, 71½, 72.
- Cast Iron Pipe Association, Chicago. Booth 202.

Chicago Bridge & Iron Works, Chicago. Booths 51, 70.
 Chicago Flag & Decorating Co., Chicago. Booth 186.
 Chicago Malleable Castings Co., Chicago. Booth 142.
 Chicago Pneumatic Tool Co., Chicago. Booths 115, 116.
 Chicago Railway Signal & Supply Co., Chicago. Booths 77, 78, 96, 97.
 Chipman Chemical Engineering Co., New York. Booth 205.
 Crerar, Adams & Co., Chicago. Booth 28.
 D. & A. Post Mold Co., Three Rivers, Mich. Booth 164.
 Detroit Graphite Co., Detroit, Mich. Booth 108½.
 Diamond State Fibre Co., Chicago. Booth 13.
 Dickinson, Paul, Inc., Chicago. Booth 98.
 Dilworth, Porter & Co., Pittsburgh, Pa. Booth 27.
 Dixon Crucible Co., Joseph, Jersey City, N. J. Booth 118.
 Duff Mfg. Co., Pittsburgh, Pa. Booth 91.
 Domestic Engineering Co., Dayton, O. Booth 14.
 Edison, Thos. A., Inc., Bloomfield, N. J. Booths 18, 19.
 Edison Storage Battery Co., Orange, N. J. Booth 20, 21.
 Electric Railway Improvement Co., Cleveland, O. Booth 1.
 Electric Storage Battery Co., Philadelphia, Pa. Booth 60.
 Eymon Continuous Crossing Co., Marion, O. Booth 170.
 Fairbanks, Morse & Co., Chicago. Booths 73, 74, 75, 76, 92, 93, 94, 95.
 Fairmont Gas Engine & Railway Motor Car Co., Fairmont, Minn. Booths 41, 42, 43.

Kettle River Co., Minneapolis, Minn. Booth 168½.
 Keystone Grinder & Mfg. Co., Pittsburgh, Pa. Booth 194.
 Kilbourne & Jacobs Mfg. Co., Columbus, O. Booth 45.
 Lackawanna Steel Co., Buffalo, N. Y. Booths 33, 34.
 Layne & Bowler Co., Memphis, Tenn. Booth 90.
 Lehon Co., Chicago. Booth 109.
 Lipman Refrigerator Car & Manufacturing Co. Booth 6.
 Long, Chas. R., Co., Louisville, Ky. Booth 90½.
 Lufkin Rule Co., Saginaw, Mich. Booth 121.
 Macomber & Whyte Rope Co., Kenosha, Wis. Booth 89½.
 MacRaes Blue Book, Chicago. Booth 9½.
 Madden Co., Chicago. Booth 195.
 Marsh & Truman Lumber Co., Chicago. Booth 213.
 Massey Co., C. F., Chicago. Booth 54, 55.
 McGraw-Hill Publishing Co., New York. Booth 8½.
 Mercury Mfg. Co., Chicago. Booths 10, 29.
 Monroe Calculating Machine Co., New York. Booth 9.
 Mudge & Co., Chicago. Booths 127, 128, 146, 147.
 M. W. Supply Co., Philadelphia, Pa. Booths 82, 101.
 Miller Train Control Corporation, Danville, Ill. Booths 197, 197½.
 National Carbon Co., Cleveland, O. Booths 151, 152.
 National Concrete Machinery Co., Madison, Wis. Booths 158½, 159.
 National Indicator Co., Long Island City, N. Y. Booth 149.



FLOOR PLAN OF THE COLISEUM AND ANNEX, SHOWING BOOTH NUMBERS

Federal Signal Co., Albany, N. Y. Booths 56, 57.
 Frictionless Rail, Boston, Mass. Booths 133, 134.
 General Electric Co., Schenectady, N. Y. Booths 35, 36, 37.
 General Railway Signal Co., Rochester, N. Y. Booths 47, 48.
 Graver Tank Works, East Chicago, Ind. Booth 138.
 Grip Nut Co., Chicago. Booths 190, 191.
 Gould Storage Battery Co., Chicago. Booths 157, 157½.
 Gurley, W. & L. E., Troy, N. Y. Booth 69½.
 Hatfield Rail Joint Mfg. Co., Macon, Ga. Booth 166½.
 Hall Switch & Signal Co., New York. Booths 85, 86.
 Hayes Track Appliance Co., Richmond, Ind. Booths 140, 141.
 Hazard Mfg. Co., Chicago. Booths 3, 4.
 Hoeschen Mfg. Co., Omaha, Neb. Booth 181.
 Hubbard & Co., Pittsburgh, Pa. Booth 143.
 Hegeman-Castle Corporation, Chicago. Booth 137.
 Ingersoll-Rand Co., New York. Booths 206, 208, 209, 210.
 International Filter Co., New York. Booths 170, 171.
 International Steel Tie Co., Cleveland, O. Booths 200, 215.
 Iowa Gate Co., Cedar Falls, Ia. Booth 193.
 Johns-Manville Co., New York. Booths 174, 175, 176, 177.
 Jordan Co., O. F., East Chicago, Ind. Booth 220.
 Julian-Beggs Signal Co., Terre Haute, Ind. Booths 7, 8.
 Kalamazoo Railway Supply Co., Kalamazoo, Mich. Booths 22, 23, 24, 25.
 Kaustine Co., Buffalo, N. Y. Booth 158.
 Kelly-Derby Co., Inc., Chicago. Booths 11, 30.
 Keppler Glass Constructions, New York. Booth 117.
 Kerite Insulated Wire & Cable Co., New York. Booths 49, 50, 68, 69.

National Lead Co., New York. Booth 81.
 National Lock Washer Co., Newark, N. J. Booth 192.
 National Malleable Castings Co., Cleveland, O. Booth 102.
 National Railway Appliances Association, Chicago. Booths 198, 217.
 National Surface Guard Co., Chicago. Booth 211.
 Nichols & Bro., Geo. P., Chicago. Booth 173.
 Northwestern Motor Co., Eau Claire, Wis. Booths 196, 196½.
 Ogle Construction Co., Chicago. Booths 12, 31.
 Okonite Co., New York. Booths 16, 17.
 O'Malley-Bear Valve Co., Chicago. Booth 114.
 P. & M. Co., Chicago. Booths 122, 123.
 Page Steel & Wire Co., New York. Booths 182, 183.
 Patterson Co., W. W., Pittsburgh, Pa. Booth 145.
 Peyton Safety Rail Joint Co., Centralia, Ill. Booth 172.
 Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa. Booths 83, 84.
 Pocket List of Railway Officials, New York. Booth 26.
 Polk-Genung-Pol Co., Chicago. Booths 165, 166.
 Positive Rail Anchor Co., Marion, Ind. Booths 178, 179, 180.
 Post, G. A., New York. Booth 204.
 Protective Signal Mfg. Co., Denver, Colo. Booths 167½, 168.
 Pyrene Manufacturing Co., New York. Booth 160.
 Q. & C. Co., New York. Booths 120, 139.
 Rail Joint Co., New York. Booths 79, 80.
 Railroad Supply Co., Chicago. Booths 104, 105.
 Railway Review, Chicago. Booth 44.
 Ramapo Iron Works, Hillburn, N. Y. Booths 109½, 110.
 Reading Specialties Co., Reading, Pa. Booths 125, 144.

Roos Foundry Co., Henry, Chicago. Booth 189.
 Roadmasters and Maintenance of Way Association, Sterling, Ill. Booth 227.
 Rivet Cutting Gun Co., Chicago. Booth 162½.
 Safe Lock Switch Machine Co., Lexington, Ky. Booths 163, 163½.
 Sellers Mfg. Co., Chicago. Booth 124.
 Signal Accessories Co., New York. Booth 119.
 Silver Steel Tie Co., New York. Booth 164½.
 Simmons-Boardman Publishing Co., New York. Booth 46.
 Simple Gas Engine Co., Menasha, Wis. Booth 165½.
 Snow Construction Co., Chicago. Booth 50½.
 Southern Pine Association, New Orleans, La. Booths 203, 212.
 Squire-Cogswell Co., Chicago. Booth 161½.
 Standard Asphalt & Refining Co., Chicago. Booths 161, 162.
 Swain Lubricator Co., Chicago. Booth 185½.
 Templeton, Kenly & Co., Ltd., Chicago. Booth 32.
 Toledo Scale Co., Toledo, O. Booth 15.
 Track Specialties Co., New York. Booth 207.
 Tyler Underground Heating System, Pittsburgh, Pa. Booth 136.
 Union Switch & Signal Co., Swissvale, Pa. Booths 66, 67.
 U. S. Wind Engine & Pump Co., Batavia, Ill. Booths 111, 112.
 Verona Tool Works, Pittsburgh, Pa. Booths 129, 148.
 Volkardt Co., Inc., Stapleton, N. Y. Booth 160½.
 Walls Frogless Switch & Mfg. Co., Kansas City, Mo. Booths 219, 219½.
 Waterbury Battery Co., Waterbury, Conn. Booth 38.
 Wayne Oil Tank & Pump Co., Fort Wayne, Ind. Booth 135.
 West Coast Lumbermen's Association, Seattle, Wash. Booths 187, 188.
 Western Electric Co., New York. Booths 58, 59.
 Wyoming Shovel Works, Wyoming, Pa. Booth 103.
 Yale & Towne Mfg. Co., New York. Booth 113.

The following firms have maintained their membership in the National Railway Appliances Association, but will make no exhibit this year:

American Automatic Connector Co., Cleveland, O.
 American Abrasive Metals Co., New York.
 Automatic Electric Co., Chicago.
 Bowser & Co., S. F., Fort Wayne, Ind.
 Cleveland Frog & Crossing Co., Cleveland, O.
 Clark Car Co., Pittsburgh, Pa.
 Cambria Steel Co., Philadelphia, Pa.
 Chicago Steel Post Co., Chicago.
 Corning Glass Works, Corning, N. Y.
 Dayton Malleable Iron Co., Dayton, O.
 Elyria Iron & Steel Co., Cleveland, O.
 Handlan Buck Mfg. Co., St. Louis, Mo.
 Hunt & Co., Robert W., Chicago.
 Hyatt Roller Bearing Co., Newark, N. J.
 Joyce-Cridland Co., Dayton, O.
 Jennison-Wright Co., Toledo, O.
 Kansas City Bolt & Nut Co., Kansas City, Mo.
 Kellogg Switchboard & Supply Co., Chicago.
 Kirby Frog & Switch Co., Birmingham, Ala.
 Louisiana Red Cypress Co., New Orleans, La.
 Lidgerwood Mfg. Co., Chicago.
 Morden Frog & Crossing Works, Chicago.
 Otley Paint Mfg. Co., Chicago.
 Railway Motor Car Company of America, Chicago.
 Railroad Water & Coal Handling Co., Chicago.
 Roberts & Schaefer Co., Chicago.
 Sperry, H. M., New York.
 Standard Underground Cable Co., Pittsburgh, Pa.
 Simmen Automatic Railway Signal Co., Buffalo, N. Y.
 Whittaker-Glesener Co., Portsmouth, O.
 Whall Co., C. H., Boston, Mass.
 Wharton & Co., Wm., Jr., Easton, Pa.

Doing Maintenance Work by Contract

BY H. KNIGHT,

Supt. of Maintenance, Erie Railroad, New York

SEVERAL YEARS AGO the Erie instituted the practice of contracting other than new construction work with outside individuals and companies on an extensive scale. Prior to that time the only work carried out in this manner had been that class of large construction work such as the building of new lines or of large structures which required an extensive plant and equipment for successful construction.

Three printed forms of contracts are made use of by the maintenance of way forces in carrying out this idea. The first of these is a simply worded, one-page form designed to cover such work as farmers and others living adjacent to the line of road are equipped to do as well or better than the railroad company's forces. This form is used to cover fence building, mowing of the right of way, small jobs of ditching, drainage, etc. The contract is prepared by the local division engineer after the receipt of bids from such local outside parties as are interested and, if the cost of the proposed work is not greater than the average cost of this class of work as indicated by his records, the form is executed by the division engineer without further authority. Upon the completion of the work, a payment voucher is prepared to cover the cost of the work, with a copy of the form attached.

This method of handling the mowing of the right of way has been so successful that it is now the exception for track section forces to be called upon to mow. The charges of the contractor compare favorably with the cost of doing the work by company forces; the company is not required to purchase and maintain a large stock of scythes and such tools and the track structure bene-

fits by reason of the two to four weeks' additional work which the track forces are thereby enabled to spend on it.

The second printed form is known as a station order and is a single sheet form authorizing the agent to pay out of station funds up to \$25 to cover small items of repair work necessary at his station. When a pane of glass is broken, a plank is required in the platform, a pipe needs thawing out or a lock needs to be repaired, instead of wiring to headquarters for a man to do the work, the agent calls on a local outside repair man and the work is accomplished in a very short time. The bill is made out and forwarded to the division engineer, who fills out the station order form on the agent. This authorizes the agent to pay for the work out of station funds after the order has been properly countersigned by the master carpenter, station supervisor or some designated party. This latter party, in the course of his regular trips over the line, inspects the work done and if found satisfactory countersigns the order and the bill is paid. Periodically these station orders are collected and voucher made to relieve the agents' accounts and take care of the distribution of costs.

The use of this form has been a decided improvement in many ways over the former method of carrying out such work by company forces. It makes possible the completion of small emergency repair jobs without delay. It does away with the necessity for men riding possibly several hours on trains to do an hour or less of work and enables the master carpenter to concentrate the time of his men on important repair work without many interruptions from trivial causes. Formerly it was not unusual for a man to make two trips on account of

a very small job, one to learn definitely what was required and the second to do the work.

The third contract form is used to cover all classes of work in maintenance not covered by the above. It is the usual general contract form similar to that employed by all railroads. Aside from work which directly involves the safety of the line and which is ordinarily carried out by company forces, maintenance work generally is contracted for by means of this form whenever reasonable offers or bids can be secured. Practically all painting work and a large portion of the mason, carpenter and plumbing work is taken care of in this manner. During the past year, in view of the shortage of labor and the difficulty experienced in securing and holding company forces, both the construction and the repair of industrial sidetracks have been largely cared for by contract, relieving the company forces of the work in connection therewith, with the exception of main line connection and signal changes.

Generally in these track contracts the company furnishes the material, the contractor supplying labor and

tools. Owners of industrial tracks have the option of contracting direct with outside parties for construction or repairs to their sidings, subject always to the inspection and acceptance of the work by the company. The railroad, upon the request of an industrial concern, will recommend a contractor experienced in doing such work, will furnish any assistance necessary in getting up the contract and will in general advise as to costs and standard methods to be followed. This has been of considerable assistance in confining the efforts of the company track forces to necessary work on its more important tracks.

In general, the carrying out of work by the various methods of contracting outlined has made it possible to complete work with greater promptness by saving the time formerly necessary to secure and assemble the materials and men. It has made possible the carrying out of a larger amount of work than could otherwise have been done by reason of labor shortage and has permitted the company forces to concentrate their efforts to work of more importance in the maintenance of the property.

Improved Road Crossing Construction

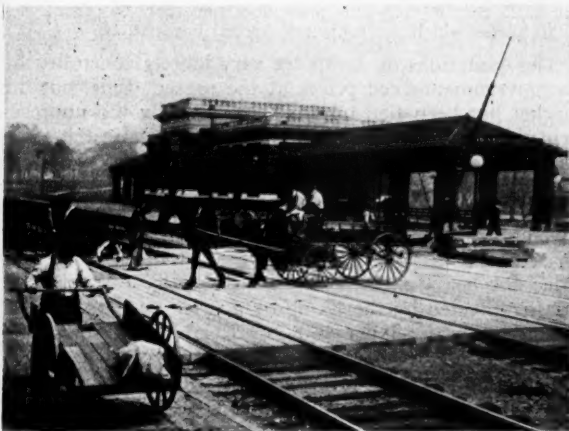
AN INTERESTING application of concrete recently brought to note is in highways crossings over railway tracks, as a substitute for the usual wooden planks. The concrete crossings have been used on several different railroads under a variety of conditions as to traffic, standards of maintenance, etc. As the service period at present is from about 10 months to over two years, a sufficient time has elapsed to demonstrate the

exact concrete equivalent of the usual wooden planking. Each concrete plank is $4\frac{3}{4}$ in. thick, 8 in. wide and 8 ft. long, except that every alternate end plank is 4 ft. long to permit breaking the joints. The reinforcement consists of American Steel & Wire Company No. 27 triangular mesh and four $\frac{1}{4}$ -in. square bars. As the planks are not as deep as the rail, they are supported on 2-in. by 6-in. wooden strips laid on top of the ties.

On the Chicago, Milwaukee & St. Paul and the Cedar Rapids & Iowa City (electric) at Cedar Rapids, Iowa, and in the yards of the Illinois Steel Company, at South Chicago, concrete crossings have been installed, in which use is made of concrete slabs that are considerably larger than the planks. Those between the rails of the track are of such a width that only two lines of them are required. The slabs at Cedar Rapids are only 8 ft. long so that two are used to make a 16-ft. crossing, while those at South Chicago are 5 ft. 6 in. long, requiring three for a 16-ft. 6-in. crossing. The slabs at both places have a thickness equal to the height of the rail so that they rest directly on the ties without the use of filler blocks or strips. It has been the idea in all of the concrete crossings to make the top surface level with the rail, except that in the case of the new design for the Universal Portland Cement Company, the slabs are crowned $\frac{1}{2}$ in. on the center line of the track and depressed $\frac{1}{2}$ in. on the center line between tracks.

The formation of the flangeway on the gage side of the rails is an important detail and was provided for in nearly all of the cases mentioned by some form of all-metal flangeway such as that obtained by a rail laid on its side with the head bearing against the web of the running rail, or with the use of an angle iron, supported on a wooden strip to give the desired elevation. With a flangeway formed in some such manner, no special detailing of the concrete slabs is necessary, although it is desirable to protect the edge of the slab adjacent to the flangeway by means of a metal guard. In the Universal Portland Cement Company's design a Kahn curb bar is used. One of the drawings shows a Burlington design in which the slab is notched out to fit under the rail to provide a flangeway.

Some question has been raised as to the need of fastening the units of the concrete crossing in place, and the



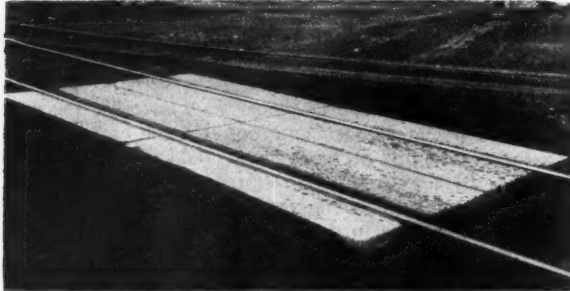
A CONCRETE SLAB CROSSING INSTALLED BY THE BURLINGTON AT DOWNERS GROVE, ILL., IN MAY, 1917.

merits of the material. A study of these crossings by the engineers of the Universal Portland Cement Company, Chicago, has brought some interesting facts to light and has led to the preparation of a new design that is to be used at the various crossings of railways tracks and highways in the plant of this company at Buffington, Ind. The drawings and photographs illustrate the manner in which the crossings have been worked out in several cases.

This concrete construction has taken two somewhat different forms. On the Chicago, Burlington & Quincy, which has installations at Hannibal, Mo., at La Grange, Ill., and at Downers Grove, the design is almost an

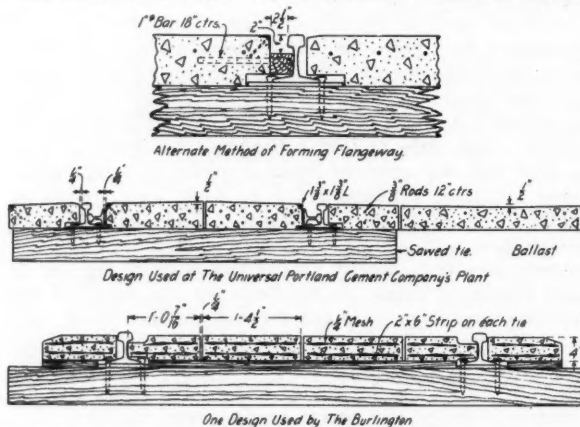
use of lag screws driven through holes cast in the slabs has been suggested, but in none of the installations recorded has it been considered necessary to take this precaution. In the concrete plank design used by the Burlington there has been some tendency for the row of planks next to the rail to creep, but this has been overcome by driving a stake at one or both ends of the row.

It is generally found of advantage to build units for use in installations of this kind at concrete plants where



A CROSSING INSTALLED AT CEDAR RAPIDS, IA.

other unit construction work is carried on. The work in the field is then restricted to the preparation of the foundation and the lifting of the units into place. On the Burlington the slabs placed in the space between tracks were founded on a sand cushion tamped by means of a 25-lb. tamper and carefully leveled off. The slabs were placed $\frac{1}{2}$ -in. below the top of rail, but after two or three days' service some of them worked up flush with the top of rail. The joints between the slabs were also filled with sand. At the Illinois Steel Company



TYPICAL DESIGNS OF CONCRETE CROSSINGS

crossing at South Chicago, granulated slag was used for the foundation bed and filling material.

The two crossings at Cedar Rapids have been in use for nearly two years and the crossing on the Burlington at Hannibal, Mo., has passed through nearly two winters, while those at the other two locations on that road have been in service since early in the spring and have passed through severe weather of the past three months in good shape. The conclusions based on an examination of these crossings after this service indicate that the concrete crossing planks afford a serviceable permanent construction. The units are readily kept in place, and with a grade of material and workmanship suited to the purpose, the concrete will stand up under the traffic.

THE MATERIAL MARKET

LATE IN DECEMBER fixed prices were established on a number of important items of track materials, as announced briefly in the January issue. This list, however, does not include rail; in fact, the situation as to this all important item of track material is in marked contrast with that of the others. While rails have long been sold at established prices which were formally advanced twice since the outbreak of the European War, they are now apparently included among the few steel commodities sold on an open market basis. For a large part of last year the fixed prices of rails were \$38 and \$40 for Bessemer and open hearth rails, respectively; but in recent months these prices have been purely nominal since very few, if any orders were placed on that basis; in fact, few orders were recorded on any terms. It now appears that rails are being sold to the railroads at prices ranging from \$60 to \$65 per gross ton, while the Government is said to be paying \$55 and \$57.

More details concerning the prices of track materials established at the close of last year will be of interest. These prices are f. o. b. Pittsburgh:

Track bolts, standard button heads, oval necks, $\frac{3}{4}$ in. and longer by $\frac{3}{4}$ in. diameter and larger, United States standard square nut with rolled threads, in lots of at least 200 kegs of 200 lb. are \$4.90 per 100 lb. For larger diameters a premium of 20 cents is charged.

Track spikes, standard $\frac{7}{8}$ in. by $4\frac{1}{2}$ in. in lots of at least 200 kegs of 200 lb. are \$3.90 per 100 lb. Longer spikes of the $\frac{7}{8}$ -in. size and spikes of $\frac{3}{4}$ -in. size of all lengths are also sold at this price.

Steel angle splice bars for standard section steel rails, 50 lb. per yard and heavier, in lots of 25 gross tons or more, which do not involve now roll equipment, are \$3.25 per 100 lb. Premiums are charged for sales in smaller quantities or for special specification requirements.

Rolled steel tie plates, all sizes and weights of iron or steel, of the single-shoulder type for use with standard section rails, are \$3.25 per 100 lb. This price does not apply to other types of tie plates which are subject to special negotiations.

The quotations on scrap are very largely controlled by the government-fixed prices at the present time, but the market has been tied up for some time by the unprecedented railway congestion. The fixed prices in the scrap list particularly affecting maintenance of way scrap, is the price of \$30 per gross ton on heavy melting scrap steel. Rails 56 lb. per yard and heavier, 5 ft. and over in length, suitable for rerolling purposes, may be purchased at a differential of not more than \$3 over this price for heavy melting scrap. The price of scrap rail is also affected by the fixing of a price on bars rerolled by old rails at \$3 per 100 lb. Relaying rails are still at a premium, sales being recorded at as much as \$60.

Although railroads are doing as little as possible in improvements requiring the use of structural steel, a few orders generally less than 500 tons are being recorded from time to time. Government requirements have had a pronounced effect on the steel fabrication industry. Whereas, the orders on the books of the fabricating shops in September aggregated a smaller total than had been the case in several years, bridge shops at the present time generally have as much business as they can handle.

The situation in the lumber market, the present status of tie production and conditions among the wood preservers as a result of the serious shortage of creosote are covered in some detail in the report of the Wood Preservers Convention appearing on other pages of this issue. Considering the shortage of labor, the lumber manufacturers have all the business they can handle, but most of this is the direct result of governmental activities and very little building construction is in progress or contemplated. The price of cement is stationary.

GENERAL NEWS DEPARTMENT

The volume of parcel post business in the month of December was greater than in the same month of 1916 by 1,173,000 sacks. The Post Office Department reports that in order to relieve the railroads, parcels are being sent from New York to Norfolk, Va., by steamer.

The daylight-saving bill was reported favorably in the lower House of Congress on February 9 by the Committee on Interstate Commerce. The bill provides for setting all clocks ahead one hour during the spring and summer months, beginning on March 30. The bill had already passed the Senate.

Suspension of manufacturing to conserve coal was ordered in Canada for three days, Saturday, Sunday and Monday, February 9, 10 and 11. The order, which was recommended by the fuel controller of the Dominion, includes munitions plants, but does not apply to the Maritime provinces or to Western Canada.

Press dispatches from Buenos Ayres, dated February 9, report that a general railroad strike was called on that day throughout Argentina. Immediately upon quitting work the strikers began a wild anarchistic demonstration throughout the country. Trains were wrecked, tracks destroyed, cars laden with wheat were burned and wires were cut.

The Alton & Jacksonville, a 21-mile, standard gage line between Alton, Ill., and Jerseyville, has suspended business and the property will be sold as junk. The Public Utilities Commission of Illinois, in an order issued last December, authorized the railway to cease operations, but the company was delayed in doing so by suits brought by the bondholders.

Director-General McAdoo has recently addressed a letter to the railroads asking for information regarding the salaries of their officers, which was requested by Senator Cummins at a recent hearing before the Senate committee. The roads are asked to state the salaries of directors and of all officers paid more than \$10,000 a year.

The Norfolk & Western has recently built at its Roanoke shops and placed in service a 100-ton hopper car of all-steel construction. This car has an inside length of 45 ft. 6 in., an extreme width of 10 ft. 1 1/4 in. and a height to top of sides of 11 ft. The light weight of the car is 60,000 lbs., making the total load, including 10 per cent overload, on the two sets of six wheel trucks 280,000 lbs.

The steel manufacturers of Canada, following conferences with the War Committee of the cabinet, have announced that the production of steel in the Dominion this year will be made 20 per cent more than last year, provided there is no failure of raw materials. Since the beginning of the war the railroads have suffered seriously from lack of rails because of the preferences given to makers of munitions.

The flood of January 28 in Southwestern Virginia washed away 15 bridges on that section of the Southern between Bristol and St. Charles, a distance of 92 miles. At the natural tunnel, 600 ft. of track was undermined. Between Big Stone Gap and Appalachia, 5 bridges were destroyed and between Appalachia and St. Charles, 6 more. There were numerous washouts all along the line and two trestles were destroyed.

A. H. Smith, Regional Director of the eastern railways, has issued a circular providing for the movement of food and other supplies eastward to the seaport from concentration points at Chicago, East St. Louis, Buffalo and Pittsburgh in solid trainloads. Definite routes have been specified for the movement of these materials from the different points of concentration. This order was issued to expedite the movement of materials which are desired by the allied governments.

Repeal of the valuation act, under which the Interstate Commerce Commission is making a valuation of railway property, is the object of a bill which has been introduced in Congress by Senator King of Utah. It is Senate bill No. 3530.

A new engineering regiment has been authorized and will be recruited by Major Frederick Mears, member of the Alaskan Engineering Commission, for active railroad construction work in France. No one will be recruited from the present employees of the Alaska Engineering Commission without the approval of the chairman. Recruiting offices for the regiment are to be opened at different points in the United States, which will be announced later.

The commanding officers on troop trains are forbidden to interfere with the schedules of the trains. This is an order from the War Department, issued as a result of repeated protests from railroads. The railroads complained that officers on trains, ignoring carefully arranged schedules, have in some instances followed their own opinions as to where and when the trains should stop for resting or exercising the men, or for feeding and watering animals.

The production of Portland cement in 1917 approximated 93,554,000 bbl., an increase of nearly 1,500,000 bbl. over the previous high record established in 1913. This production was approximately 2,000,000 bbl. greater than that for 1916. Shipments in 1917 were approximately 90,630,000 bbl., or nearly 4,000,000 bbl. below those of 1916, which established a record in this respect. Stocks at the mills increased more than 2,800,000 bbl. or 33.7 per cent as compared with 1916.

A zone system for the distribution of coal is being developed by a committee appointed by Director-General of Railways McAdoo and the fuel administrator. The work of this committee will be to develop a system of coal distribution which will insure the speediest possible movement of coal from the mine to the consumer and the immediate return to the mines of empty coal cars. It will eliminate, as far as possible, cross hauling of coal by providing for the movement from the mine to the consumer on the shortest possible transportation lines. The production fields of the country have been divided into 20 districts, each in charge of a representative who will see that the coal is distributed according to the authorized allotments.

The Port Augusta-Kalgoorlie railway, a transcontinental line connecting the two points with these names in southern Australia, has recently been completed and opened for traffic. This line, which is 1,053 miles long, connects the western Australia line from Perth with the southern Australia railway extending to Adelaide, Melbourne and Sydney. This line passes through a large area without water facilities and it was necessary to develop adequate supplies before construction work could be undertaken. The standards of construction and of equipment follow those of the United States more closely than those of Europe. The line is built to standard gage. With this line in service it is now possible to make a continuous journey by rail from Townsville through Brisbane, Sydney, Melbourne and Adelaide to Perth, a total distance of 4,000 miles in 150 hours.

The Priorities Division of the War Industries Board of the Council of National Defense has issued revised rules and regulations covering the granting of priority certificates under date of January 1. These regulations do not interfere with priority certificates already issued, but cover the issuance of instructions in the future. These apply particularly to manufacturers of copper, iron and steel products, and of certain other materials. All orders and work are divided into four general classes: Class AA, Class A, Class B and Class C, with subdivisions indicated by suffix number, thus: Class

AA-1, etc. The order also defines the rules under which precedence is given and defines the advantage to accrue through the holding of a priority classification. It also specifies by whom applications for priority shall be made and the information necessary for the filing of an application.

RAILROADS RECOVERING FROM STORMS

The roads are recovering rapidly from the congestion and blockades caused by the severe storms throughout January. In many instances it was necessary to suspend operations almost entirely for several days at a time during the most severe storms and to concentrate the energies of the roads almost entirely upon efforts to open the lines. A shortage of motive power and of workmen to repair locomotives added greatly to the congestion. This difficulty has been particularly serious in the vicinity of Pittsburgh and on the main line of the Pennsylvania between that point and Philadelphia. Early in February the weather moderated and since that time conditions have improved greatly. The records of delayed freight issued by the Eastern Regional Director show that the larger roads are reducing the congestion of cars at eastern terminals at the rate of 5,000 to 8,000 cars a day, including both eastbound and westbound movement. While the congestion and shortage of motive power are still serious, with a continuation of moderate weather traffic will move more easily and the crisis should soon disappear.

The warmer weather has led to the movement of the ice in the Ohio river and tributary streams which have destroyed a considerable amount of railway property in that territory. One of the most serious losses was the destruction of the Baltimore & Ohio bridge crossing the Miami river at Lawrenceburg, Ind., forcing that road to detour its traffic over another line.

THE DIRECTOR-GENERAL'S ORGANIZATION

Wm. G. McAdoo, Director-General of Railroads, announced the organization of his permanent staff on February 6. On his appointment as director-general, Mr. McAdoo requested the railroads' war board and its organization to assist him, which it did until he had an opportunity to appoint a temporary organization in January. This temporary organization has now been superseded by a permanent organization, which is departmental in character. This organization is as follows:

Assistant to the Director-General, Walker D. Hines, chairman of the executive committee and general counsel of the Atchison, Topeka & Santa Fe.

General counsel, John Barton Payne, general counsel, Chicago Great Western.

Director, division of transportation, Carl R. Gray, president, Western Maryland.

Director, division of traffic, Edward Chambers, vice-president, Atchison, Topeka & Santa Fe.

Director, division of finance and purchases, John Skelton Williams.

Director, division of labor, W. S. Carter, president, Brotherhood of Locomotive Firemen and Enginemen.

Director, division of public service and accounting, Charles A. Prouty, director Bureau of Valuation, Interstate Commerce Commission.

Additional divisions will be created from time to time as conditions may justify. The Director-General has in contemplation a division on capital expenditures and improvements.

Frank McManamy, chief inspector of locomotive boilers of the Interstate Commerce Commission, has been appointed manager of the locomotive section and is attached to the division of transportation. He will also continue in his present office. Henry Walters, chairman of the Atlantic Coast Line and of the Louisville & Nashville, who was appointed as a member of Mr. McAdoo's temporary staff, will continue to act in an advisory capacity. W. T. Tyler, assistant to the vice-president of the Northern Pacific, and H. T. Bentley, superintendent of motive power and machinery of the Chicago & North Western, are acting temporarily as

assistants to Mr. Gray in the transportation division. The Commission on Car Service and the Bureau of Car Service of the Interstate Commerce Commission have been merged and are attached to the transportation division.

THE PRESIDENT'S RAILROAD PLAN BEFORE CONGRESS

The bills embodying the President's recommendations concerning the taking over and operation of the railways have been reported out of committees and are now being discussed in the House and Senate. These bills adhere closely to the recommendations of the President as set forth in his statement announcing his decision to take over the roads late in December, with the exception that the Senate sets a limit of 18 months after the proclamation of peace and the House two years for the return of the roads to their owners. A further important departure limits the rate-making power of the President by making the Interstate Commerce Commission a party in the determination of any increases. In presenting this bill to the Senate the committee stated that the government will guarantee to the roads approximately \$945,000,000 a year, which is equivalent to its average annual operating income for the three years ending June 30, 1917. The government will also pay a return upon the cost of additional facilities provided since that date. A minority report was submitted opposing the guarantee of this sum to the roads. While Director-General McAdoo has been largely unsuccessful in his efforts to hasten the passage of this bill, it is the general opinion that in its final form it will differ but little from that submitted by the majority of the committee.

THE RAILWAY WAGE COMMISSION

Director-General McAdoo has appointed a wage commission consisting of Franklin K. Lane, Secretary of the Interior; C. C. McChord, member of the Interstate Commerce Commission; J. Harry Covington, chief justice of the Supreme Court of the District of Columbia, and W. R. Wilcox, chairman of the Republican National Committee, to investigate railway wages. This commission began a series of public hearings on January 29. At the opening session the chairman stated that "The commission shall make a general investigation of the compensation of persons in the railroad service, the relation of railroad wages to wages in other industries, the conditions respecting wages in different parts of the country, the special emergency respecting wages which exists at this time owing to war conditions and the high cost of living, as well as the relation between different classes of railroad labor. * * *

"We look at the problem before us as not 'what does organized labor or unorganized labor demand,' but what with war upon us and living costs as they are, should be the compensation given for the services rendered. * * *

"There are 1,800,000 employees on our railroads. Some are organized and have great power for self-help. The great majority, more than two-thirds, are, however, not organized. We shall consider both classes, and upon an equal footing, so far as that may be practicable. * * * We wish, first of all, to know what present conditions are. What data have already been gathered as to the number of employees, their classification in groups according to their duties, their compensation in money and that compensation converted into terms of support for themselves and their families. This leads into a study of the present cost of living as contrasted with the cost at other periods. The various governmental agencies, the railroads themselves, the larger organizations of labor and individual studies will doubtless prove to have already gathered the greater part of these facts. Wherever there is a shortage this must be supplemented, and to this end we shall feel free to call upon railroads and employees, the government departments and other agencies for such facts as they can furnish."

Representatives of a number of the railway organizations and of non-organized employees have already appeared before this commission to present their cases, and others will.

PERSONAL MENTION

GENERAL

R. H. Pinkham, division engineer of the Pittsburgh division of the Pennsylvania Railroad at Pittsburgh, has been appointed assistant superintendent on the same division, with headquarters at Cresson.

W. L. Ekin, division engineer on the Pennsylvania Lines, St. Louis System, with headquarters at Terre Haute, Ind., has been promoted to superintendent of the Peoria division, with headquarters at Decatur, Ill., effective February 11, succeeding Taber Hamilton, transferred. He entered the service of the Pennsylvania Lines on July 6, 1900, and was appointed assistant engineer on the Michigan division on September 1, 1905. He was promoted to division engineer on the same division on May 1, 1907, and was later transferred to the St. Louis division, with headquarters at Terre Haute, Ind., which position he held at the time of his recent appointment.

Ralph Budd, who has been elected executive vice-president of the Great Northern, is an engineer by training and experience. He was born on August 20, 1877, at Waterloo, Iowa, and graduated from Highland Park College of Engineering at Des Moines, Iowa, in 1899, beginning his railway work in July of that year with the Chicago Great Western. Until 1902 he was consecutively draftsman, rodman, levelman, instrumentman and assistant engineer, and from the latter date to 1905 was successively roadmaster, general superintendent of construction on the St. Louis division and division engineer of that division. He was then transferred to Chicago as division engineer. The following year he became chief engineer of the Panama Railroad at Colon, Panama, where he remained until 1909, when he went to the Oregon Trunk as chief engineer. From 1910 to May 1, 1914, he also was chief engineer of the Spokane, Portland & Seattle, and from 1911 to January 1, 1913, also chief engineer of the Spokane & Inland Empire and the Spokane Traction Company at Portland, Ore. Mr. Budd was made assistant to the president of the Great Northern on January 1, 1913, and on February 15 was appointed chief engineer. On May 1, 1914, he again became assistant to the president, which position he retained until his recent election as executive vice-president.

ENGINEERING

F. W. Epps, office engineer of the Kansas City Terminal Railway, has resigned to become bridge engineer of the Kansas State Highway Commission, Topeka, Kans.

S. F. Ryan has been appointed acting assistant engineer on the Mobile & Ohio, with office at Mobile, succeeding **L. P. O. Exley**, who has been assigned to other duties.

V. B. Wagner, chief engineer of the Colorado Midland, has been appointed chief engineer of the Cripple Creek & Colorado Springs, with office at Colorado Springs, Colo., succeeding **M. J. Burgdorf**.

J. H. Roach, valuation engineer of the New York Central lines west, has been appointed valuation engineer of the lines east and west of Buffalo, with headquarters at New York and Cleveland, Ohio.

C. E. Zortman, division engineer of the Conemaugh division of the Pennsylvania Railroad, at Pittsburgh, has been transferred to the Delaware division, with headquarters at Wilmington, Del., succeeding **S. L. Church**, who changes places with Mr. Zortman.

J. A. Gillies, district engineer of the Atchison, Topeka & Santa Fe, at Amarillo, Tex., has been transferred to the Northern district, with headquarters at La Junta, Colo., succeeding **R. A. Rutledge**, who has been transferred to the Southern district, with headquarters at Amarillo, Tex.

M. F. Longwell, resident engineer on the Union Railway at Memphis, Tenn., has been appointed engineer maintenance of way of the Wabash, with headquarters at Montpelier, Ohio.

A. A. Matthews has been appointed chief engineer of the St. Louis Southwestern of Texas, with headquarters at Tyler, Tex., succeeding **W. T. Eaton**, who has been assigned to other duties.

H. H. Tripp, resident engineer on the Canadian Pacific, at Kenora, Ont., has been transferred to the Edmonton division, with headquarters at Edmonton, Alb., succeeding **R. C. Harris**, who has been transferred to the Calgary division.

K. G. Williams, assistant engineer on the Chicago, Rock Island & Pacific, with office at Memphis, Tenn., has been appointed resident engineer of the Union Railway at Memphis. He will also continue his services with the Rock Island, the Arkansas & Memphis Railway Bridge & Terminal Company and the American Bauxite Company.

N. F. Thompson, district engineer on the Middle district of the New York Central, with office at Albany, N. Y., has been transferred to the Western district, with headquarters at Buffalo, succeeding **F. E. Paradis**, who has resigned. **B. C. Martin**, district engineer of the Hudson River Connecting Railroad, with office at Castleton, has been transferred to the Middle district, succeeding Mr. Thompson, but will also retain supervision over the work on the Castleton cut-off.

R. C. Miller, division engineer on the Toledo division of the Pennsylvania Railroad, Western Lines, with headquarters at Toledo, Ohio, has been transferred to Terre Haute, Ind., succeeding **W. L. Ekin**, who has been appointed superintendent, as noted elsewhere in these columns. **J. K. Sherman**, division engineer at Zanesville, Ohio, succeeds Mr. Miller at Toledo. **W. H. Brown**, assistant division engineer, with office at Chicago, has been appointed division engineer, succeeding Mr. Sherman at Zanesville.

C. W. Richey, master carpenter of the Pittsburgh division of the Pennsylvania Railroad, with headquarters at Pittsburgh, has been promoted to assistant division engineer, with headquarters at the same place, to succeed **W. E. Brown**, who has been appointed division engineer of the Elmira division, with office at Elmira. He succeeds **C. M. Wisman**, who has been transferred to the Allegheny division, with office at Oil City, and takes the place of **E. J. Ayers**, who in turn has been transferred to the Williamsport division, with headquarters at Williamsport. **R. Faries**, division engineer at Williamsport, has been transferred to the Pittsburgh division, with headquarters at Pittsburgh, succeeding **R. H. Pinkham**, promoted to assistant superintendent, as noted elsewhere.

H. M. Lull, whose appointment as division engineer of the Southern Pacific, with headquarters at Portland, Ore., was announced in these columns, was born at Windsor, Vt., on March 31, 1875. He graduated from Dartmouth College in 1897, and for several years was engaged as a teacher of mathematics in a number of schools. He entered railway service with the Southern Pacific in May, 1906, as a draftsman in the district engineer's office at San Francisco, Cal., becoming in turn assistant engineer on the Western division, draftsman and computer, construction department, assistant engineer on the construction of suburban electric lines at Oakland and Berkeley, assistant engineer in the district engineer's office in Portland and principal assistant engineer of construction of the Portland, Eugene & Eastern, a subsidiary of the Southern Pacific. It was from this position that he was promoted to division engineer, as noted above.

W. O. Galbreath, of the engineering department of the Chicago Great Western, has been appointed chief engineer of the Missouri, Oklahoma & Gulf, with headquarters at Muskogee, Okla. He was born in Porter County, Indiana, and graduated from Kansas University in 1898. In 1899 he entered railway service in Mexico with the Mexican Central and later with the Mexican National and the National Rail-

ways of Mexico, doing location, construction and maintenance work. He remained in Mexico until 1912, when he accepted a position as engineer maintenance of way with the Missouri & North Arkansas, holding this position until 1916, when he went with the Chicago Great Western. He was with this road when he was appointed chief engineer of the Missouri, Oklahoma & Gulf, as noted above.

H. Stringfellow, assistant engineer on the Southern Railway, at Eutaw, Ala., has been appointed district engineer at Lexington, Ky., succeeding **H. P. Mehler**, assigned to other duties. Mr. Stringfellow was educated at the University of the South, graduating with the class of 1902. He entered the employ of the Mobile, Jackson & Kansas City, now the Gulf, Mobile & Northern, in January, 1903, serving as transitman in the engineering department until May of the same year, when he entered the employ of the Southern. Since that date he has been employed continuously by the Southern, with the exception of one year, from September, 1913, to September, 1914, during which time he was general superintendent for a contractor on the construction of a filtration plant for the city of Baltimore, Md., and as engineer in charge of field work for the railroad in connection with the valuation of the Atlanta, Birmingham & Atlantic. In September, 1914, he returned to the Southern as assistant engineer on location and construction.

A. A. Culp, assistant engineer, operating construction department of the Southern Railway at Pomona, N. C., whose appointment as resident engineer at Selma, N. C., in charge

of new yard and engine terminal facilities at this point was announced in these columns in January, began his railway career in 1811 as a rodman in the construction department of the Louisville & Nashville, working successively as rodman at Butler, Ky., masonry inspector at New Castle, Ala., and tunnel inspector in charge of the concrete lining of the tunnel at Kingdom Come creek on the Lexington & Eastern extension of the Louisville & Nashville, with headquarters at Whitesbury, Ky. In January, 1913, he was made assistant engineer on double-track construction, with headquarters at Brick Church, Tenn. In August, 1913, he entered the employ of the Southern as transitman at Charlotte, N. C., and in July, 1914, he was made junior engineer at the same point. He was made assistant engineer in November, 1914, in charge of double-tracking in Virginia, serving in this capacity until July, 1916. He then entered the employ of the construction department of the Pennsylvania at Philadelphia, Pa., working jointly for the railroad and the city of Philadelphia, making surveys and calculations for concrete viaducts in connection with the South Philadelphia track elevation. In March, 1917, he returned to the Southern as assistant engineer at Pomona, which position he held until his recent appointment as resident engineer.

L. B. Allen, general superintendent of the western general division of the Chesapeake & Ohio at Huntington, Va., has been appointed superintendent of maintenance of way of the Chesapeake & Ohio system, with the same headquarters. He was born April 19, 1879, at Lexington, Ky., and graduated from the Kentucky State College in 1899, with the degree of civil engineer. He began railway work in the same year as a rodman on the Southern Railway, and from August, 1899, to January, 1904, was engaged on location and construction work on the Chesapeake & Ohio. He was then for one year assistant in the office of the engineer of main-

tenance of way, and from January, 1905, to May, 1910, was division engineer of the Kentucky division at Ashland, Ky. From May 1, 1910, to 1914, he served as engineer maintenance of way of the Kentucky general division of the same road and the Chesapeake & Ohio of Indiana, with office at Covington, Ky., and as assistant chief engineer. In February, 1914, he was appointed superintendent of the Huntington and Big Sandy divisions of the Chesapeake & Ohio. He later served as general superintendent of the western general division.

TRACK

George C. Chittenden has been appointed roadmaster on the Northern Pacific, with headquarters at Seattle, Wash., succeeding **C. C. Blood**, transferred.

George Santhu has been appointed roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Needles, Cal., succeeding **E. F. Cagle**, who has been transferred to Kingman.

William H. Jones, section foreman on the Atchison, Topeka & Santa Fe, with headquarters at East Fort Madison, Ill., has been made assistant roadmaster, with headquarters at Joliet, Ill.

J. H. Thomas, section foreman on the Erie at Lancaster, N. Y., has been appointed supervisor on the Bradford division at Bradford, Pa., succeeding **John Hart**, who has been made general foreman on the same division.

A. H. Barkley, supervisor on the Wabash, with headquarters at Springfield, Ill., and who was for forty-five years in continuous service with that company, has resigned. He is succeeded by **A. V. Pyle**, yard foreman at Bluffs, Ill.

W. A. Todd, general roadmaster on the Charleston & Western Carolina, with office at Augusta, Ga., has been assigned to the duties of trainmaster, in addition to those of roadmaster, with the title of trainmaster and general roadmaster.

George P. McKenna, assistant supervisor of track on subdivision No. 2 of the Boston & Albany, with headquarters at Worcester, Mass., has been promoted to supervisor at the same point, succeeding **R. C. Ashenden**, who has resigned to accept a position elsewhere. **Allen Curtis** succeeds Mr. McKenna as assistant supervisor.

George W. Clark has been appointed assistant supervisor of track on the Mohawk division of the New York Central, with headquarters at Utica, N. Y. Mr. Clark has been employed in the maintenance of way department of the New York Central for a number of years as laborer, section foreman, work-train foreman and general foreman in the Buffalo district.

A. Shumate, roadmaster on the Nebraska division of the Chicago, Rock Island & Pacific, in charge of the line from Horton, Nebr., to Jansen, and from Fairbury, Nebr., to Elson, with headquarters at Fairbury, Neb., was transferred to the Albright subdivision of the Nebraska division, with the same headquarters, succeeding **J. Archer**, who succeeds Mr. Shumate.

W. H. Park, roadmaster on the Missouri Pacific at Conway Springs, Kans., has been transferred to the Coffeyville district, including lines between Osawatimie and Jefferson, with headquarters at Coffeyville, Kan. **Wm. Weiland**, roadmaster at Coffeyville, has been given jurisdiction from Coffeyville to Dexter and the Roper and Arkansas City branches, with the same headquarters, while **G. W. Tull**, roadmaster at Coffeyville, has been given charge of the line from Dexter to Larned, including the Iuka branch, with headquarters at Conway Springs, Kans.

Elmer Swanson, yard foreman on the Chicago, Milwaukee & St. Paul rail mill at Savanna, Ill., has been made foreman of the rail saw mill at that place, succeeding **John Reinehr**, who has been made superintendent of the frog and switch shop at Tomah, Wis., as previously announced. After two years' employment as a laborer at the Chicago, Burlington



A. A. CULP.

& Quincy storehouse at Aurora, Ill., Mr. Swanson went to Savanna in 1904, where he started work in the Chicago, Milwaukee & St. Paul rail mill, being employed for two years as a laborer and two years as assistant yard foreman. He was made yard foreman in 1908, which position he held until his recent promotion to foreman of the rail mill.

W. A. Moberly has been appointed roadmaster on the Chicago terminals of the Chicago, Milwaukee & St. Paul, with office at Chicago, taking over part of the territory previously in charge of M. Burke, roadmaster. **F. Larson** has been appointed roadmaster on the Iowa and Minnesota division, with headquarters at Austin, Minn., succeeding **M. McShane**, who has been assigned to other duties. **W. J. Hardin** has been appointed roadmaster on the Rochelle and Southern division, with headquarters at Mendota, Ill., succeeding **H. A. Buel**, who has been assigned to other duties.

August Wagner has been appointed assistant roadmaster on the Mesabi division of the Great Northern, with headquarters at Kelly Lake, Minn., succeeding **P. A. Franco**, who has resigned. **I. E. Vaughn**, assistant roadmaster on the Havre division, with headquarters at Great Falls, Mont., has been transferred to Conrad, and is succeeded at Great Falls by **C. E. Daggett**. **James Sullivan, Jr.**, has been appointed assistant roadmaster on the Havre division, with headquarters at Cut Bank, succeeding **E. F. Mulkern**, who has been transferred. **Edward Erickson** has been appointed assistant roadmaster on the Breckenridge division, with headquarters at Casselton, N. D., succeeding **Matt Browick**, transferred.

N. Johnson, who has been appointed division roadmaster of the Marcus division of the Great Northern, with headquarters at Marcus, Wash., began railway work as a section laborer on the Butte division of the Great Northern in May, 1902. In June, 1903, he was made section foreman on the same division, where he remained until September, 1907, when he was made extra gang foreman. In December, 1909, he was made foreman for Stone & Webster at Holter dam, Wolf Creek, Mont. In November, 1910, he returned as section foreman on the Butte division, and from March, 1911, to September of the same year he was extra gang foreman. In September, 1911, he was made assistant roadmaster of the Butte division, where he remained until June, 1917, when he was made section foreman on the Spokane division, remaining there until November of the same year, when he became assistant roadmaster on the Butte division. On January 1, 1918, he was made division roadmaster, as noted above.

BRIDGE

G. A. Easton, scale inspector on the Northern district of the Southern Pacific, has been appointed general scale inspector of the Pacific system, with headquarters at West Oakland, Cal., effective February 1, 1918. He entered railway service with the Southern Pacific on January 1, 1900, as a blacksmith in the maintenance of way department, remaining in that position until August, 1903, when he was placed in charge of all maintenance of way equipment at West Oakland. In October, 1904, he was transferred to the scale shop, repairing and forging scale parts, where he remained until July 1, 1906, at which time he was made scale inspector of the Northern district. He held this position when appointed scale inspector, as noted above.

PURCHASING

W. E. Allen has been appointed purchasing agent of the Gulf, Florida & Alabama, with office at Pensacola, Fla.

MISCELLANEOUS

H. B. Hoyt, assistant superintendent of the Buffalo, Rochester & Pittsburgh timber preserving plant at Bradford, Pa., has been promoted to superintendent of this plant, succeeding **G. S. Harden**, resigned to enter other business. Mr. Hoyt was born at Wellsville, N. Y., in 1887. He was educated at Cornell University and graduated as a civil engineer

with the class of 1909. He began railway work that year in the maintenance department of the New York Central, serving successively as chainman, rodman and transitman. In 1910 he was made special representative and inspector for P. H. Dudley, consulting engineer of rails and steel of the New York Central lines at New York City. From 1912 to 1916 he served as assistant supervisor of track at Canandaigua, N. Y., and Rochester. In 1916 he left the service of the New York Central to become assistant superintendent of the timber preserving plant of the Buffalo, Rochester & Pittsburgh, the position he held when recently promoted.

IN MILITARY SERVICE

C. W. Haupt, assistant engineer in the valuation department of the Illinois Central, Chicago, has received a commission as second lieutenant in the engineering corps of the United States army.

John Sesser, assistant general superintendent on the Great Northern at Great Falls, Mont., and formerly engineer maintenance of way, has been given an indefinite leave of absence, in order that he might join the American Expeditionary forces in France.

P. M. LaBach, assistant engineer on the Chicago, Rock Island & Pacific at Chicago, Ill., has been commissioned a major by the War Department, and is to leave shortly for France to take charge of the water service on a portion of the American military railways.

Major Frederick Mears, who has been a member of the Alaskan Engineering Commission of the past three years, in charge of the work at Anchorage, Alaska, has been relieved at his own request, in order to return to the army. He is to be commissioned a colonel by the war department and placed in command of an engineering regiment engaged in railroad work in France.

OBITUARY

J. W. Bushnell, formerly chief engineer of the Florida Railway & Navigation Company, now a part of the Seaboard Air Line, died at his home in Tallahassee, Fla., on February 4, at the age of 66.

C. A. McLeod, secretary of the Canadian Society of Civil Engineers and vice-dean of the faculty of applied science of McGill University at Montreal, Que., died in that city on December 26. He was professor of Geodesy and surveying and had charge of McGill Observatory. He was born at Strathlorn, Cape Breton, New Brunswick, in 1851, and his first engineering work was done while in charge of construction on the Intercolonial. He subsequently became resident engineer on construction of the Prince Edward Island. He was a member of several societies and institutes in the United States and Canada.

Joseph Hobson, consulting engineer of the Grand Trunk, with office at Montreal, Que., died at Hamilton, Ont., on December 19, 1917, at the age of 84 years. He was born at Guelph, Ont., in March, 1834, and entered the service of the Grand Trunk as assistant engineer on construction work west of Toronto in March, 1858, and virtually had a continuous record of service with the system from that date until his death. He served as assistant engineer on various lines in Nova Scotia, Ontario and Michigan for several years; from June, 1869, to April, 1870, he was engineer of construction of the Wellington, Grey & Bruce; from that time to November, 1873, he was resident engineer on the International Bridge near Buffalo, N. Y. He then became chief assistant engineer of the Great Western, which position he held until June, 1875, when he was promoted to chief engineer of the same road, now the Great Western division of the Grand Trunk System. On February, 1896, he was made chief engineer of the Grand Trunk System, which position he held until July 4, 1907, when he was appointed consulting engineer. He was also chief engineer and builder of the St. Clair tunnel and the Victoria bridge over the St. Lawrence river.

SUPPLY TRADE NEWS

GENERAL

The Pittsburgh Wood Preserving Company, the Ohio Wood Preserving Company, the Michigan Wood Preserving Company and the Acme Tie Company have moved their general offices from the Commonwealth building to the Century building at Pittsburgh, Pa.

The Walter A. Zelnicker Supply Company, St. Louis, Mo., has established permanent offices at 627 Plymouth building, Minneapolis, Minn., to serve the north central and Canadian trade. Richard K. Papin, who formerly was the St. Louis and southwestern representative of the Davenport Locomotive Works, and for ten years manager of the Zelnicker company's equipment department, is in charge of this new office.

The Louisville Frog & Switch Company, Louisville, Ky., has been incorporated with a capital stock of \$200,000 to take over the business of the W. M. Mitchell Company, Inc., and to manufacture switches, frogs, crossings and other special track work and fastenings. The officers include W. M. Mitchell, president, and H. O. Wieland, secretary and treasurer. Charles H. Krauss, superintendent of the Weir Frog Company, Cincinnati, Ohio, has resigned to become general superintendent of the Louisville Frog & Switch Company. Previous to his connection with the Weir Frog Company, Mr. Krauss was connected with the Lorain Steel Company, Johnstown, Pa., and with the Kilby Frog & Switch Company, Birmingham, Ala., for a number of years in the capacity of superintendent.

The Chicago Pneumatic Tool Company is doing four times as much business as in the pre-war period, according to its annual report for the year ended December 31, 1917, recently made public. In addition, the net profits have exceeded those of any previous year, even after providing for an additional tax of 4 per cent on the company's net income and for the excess profits war tax. The company's plants have been taxed to capacity to fill the orders received, making improvements and additions necessary. At the same time the physical condition of the plants has been maintained as usual. The British and Canadian subsidiary companies, both more or less under the control of their respective governments, retained their earnings for the year for additional working capital.

PERSONAL

P. M. Wagstaff has been appointed railroad representative for the Onondaga Steel Company, Inc., Syracuse, N. Y.

Charles S. Bilyeu, who recently became associated with the Gulick-Henderson Company, New York, has been appointed assistant to the president.

F. A. Driver, for many years a director of the Driver-Harris Wire Company, and identified with the company since its inception, died on January 21 at the age of 82 years.

C. H. Wilson, southwestern railroad representative for Fairbanks, Morse & Co., has been appointed first lieutenant in the Engineers' Reserve Corps, and has been assigned to active duty.

G. F. Evans, formerly with the W. C. Moore Company, Columbus, Ohio, has been appointed supervising engineer for the National X-Ray Reflector Company, in the territory comprising Ohio, except Toledo and Cincinnati, West Virginia and western Pennsylvania. His headquarters are at Columbus, Ohio.

W. N. Thornburgh, vice-president and general manager of the Harrison Railway Specialties Company, will devote his entire time as president and treasurer of the William N. Thornburgh Company, dealers in used rail, cars and locomotives,

and manufacturers of the "National" steel and wood dust guard, in connection with the latter company, with offices as before at 332 South Michigan boulevard, Chicago, Ill.

Wilson S. Kinnear, E. A. Little and Carl H. Stengel announce the opening of the office of W. S. Kinnear & Co., engineers-investigators, at 111 Broadway, New York. The company will make general engineering and investment reports, investigations, valuations and reports on steam and electric railways. It may also be consulted on terminal, harbor and dock improvements and developments, land and subaqueous tunnels and heavy construction estimates and supervision, and will specialize on railway and public utility reports and valuations.

H. S. Cooper, vice-president of the Independent Pneumatic Tool Company, and for many years manager of the company's eastern branch in New York City, has assumed, in addition to his regular duties, those of general sales manager, having his headquarters at the general offices of the company, Thor building, Chicago. R. T. Scott, the former Pittsburgh branch office manager, has been promoted to eastern manager, with headquarters at 170 Broadway, New York, and H. F. Finney, who formerly traveled the Chicago and St. Louis territories, has been placed in charge of the company's branch office at Pittsburgh, Pa. The Independent Pneumatic Tool Company manufactures pneumatic tools and electric drills.

TRADE PUBLICATIONS

Standardized Buildings.—The Trussed Concrete Steel Company, Youngstown, Ohio, has just published an interesting illustrated booklet of 24 pages describing its standardized buildings which are carried in stock for quick construction. The design of the buildings is shown in detail, with information concerning their erection and a number of photographs of the buildings in service.

The Speedster.—The Blaw-Knox Company, Pittsburgh, Pa., has issued a leaflet illustrating and describing the Blaw Speedster bucket, a new bucket of the Blaw type, designed primarily for use as a rehandling bucket. Mention is made of several unusual records for speed of operation and amount of material handled in a given time.

CONSTRUCTION NEWS

The Black Mountain Railroad has awarded a contract to J. H. Bailey, to build an eight-mile line from Hulan, Ky., on the Cumberland branch of the Louisville & Nashville, up Puckett's creek to serve coal lands. The maximum grade will be 2 per cent, the maximum curvature 10 deg., and there will be 6 bridges. Work is already under way.

The Southern will make additions to the facilities at Sheffield, Ala., for handling the increase in traffic incident to the location of the government nitrate plant at this place. The present passenger and freight stations will be enlarged, additional yard tracks will be installed, and additions to the local shop facilities are also contemplated.

The Philadelphia & Reading has given a contract to A. L. Carhart for improvements to be made at Skillman, N. J., including the construction of a brick power house 33 ft. wide by 74 ft. long, on concrete foundations with a concrete coal pocket at one side 16 ft. wide by 34 ft. 5 in. long. The roof and floor construction will be of steel and reinforced concrete, and the roof covering of asbestos and asphalt.

The Chicago Union Station Company plans to build a 14-story warehouse, 328 ft. by 151 ft. on Canal street, between Washington and Randolph streets, Chicago, which will be constructed by John Griffiths & Sons, contractors, and will cost about \$2,500,000. The building will be erected for Butler Bros. and W. R. Linn, to take the place of a warehouse which was acquired and must be removed by the Union Station Company, in order to make room for terminal facilities.

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